Number 112 August 2011

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 Alex James and Rachael Tappenden with the help of Phil Wilson and Pauline Auger and printed at University of Canterbury. The official address of the Society is:

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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 nzmseditor@math.canterbury.ac.nz.

ISSN 0110-0025 (Print), ISSN 1178-8879 (Online)

PRESIDENT'S COLUMN

Mathematics of Planet Earth 2013 is an initiative focusing on mathematical research related to planetary issues. To be interpreted as broadly as possible, such issues include meteorology and climate, solar systems, ecology, biodiversity, communication and transport networks, economics, political systems, epidemics and, appropriately, natural disasters. A wide variety of activities will be taking place around the world including thematic programs, collaborative research groups, and outreach with the public and schools. As with many mathematical organisations, the New Zealand Mathematical Society and the New Zealand Institute of Mathematics and its Applications are partners in this initiative. If anyone is interested in coordinating the activities of the NZMS, please contact a member of Council. For further details of the initiative, see www.mpe2013.org.

Geoff Whittle's Aitken Lectures are taking place in October 2011. Starting at St Andrew's (6 October), he will be subsequently visiting Manchester, Cambridge, Queen Mary, and Oxford. Funded by the London and New Zealand Mathematical Societies, Geoff is the inaugural recipient of this award.

Charles Semple
President

EDITORIAL

Kia ora koutou

Another welcome after what may be the shortest retirement in history! Despite a long search there is still no new editor for the newsletter so I have been persuaded by the council (and Rachael's offer of support!) to assemble another "last" edition of the newsletter. So a final plea to any budding editors out there, if you are interested in the position I can recommend it wholeheartedly.

Alex James
Editor

LOCAL NEWS

AGRESEARCH

Amy Van Wey presented her work on nutrient transport within bacterial biofilms at the annual Riddet Institute Student Colloquium in July.

Kumar Vetharaniam attended the 19th Biennial Meeting of The New Zealand Branch of the International Association for Plant Biotechnology in Hanmer Springs and gave a talk "Modelling the plant cell wall: building it up to break it down".

Tony Pleasants visited the University of Southampton in July to discuss a joint project on epigenetics.

Paul Shorten attended the ICIAM 2011 meeting in Vancouver in July and gave a talk on pregnancy recognition in mammals as part of the reproduction modelling minisymposia.

Paul Shorten and his wife Mami also welcomed their second child Emily Naomi Shorten, born on the 14th of March 2011. Emily is doing well.

Emily Naomi Shorten with older brother Liam.

Paul Shorten

THE UNIVERSITY OF AUCKLAND

DEPARTMENT OF COMPUTER SCIENCE

John Hosking, who has been with the department almost since its beginning in 1980 and has served as HoD, has added to his impressive CV. He has been appointed Dean of the College of Engineering and Computer Science at the Australian National University and will be leaving us at the end of the year. This will leave a considerable hole in the department.

Emilia Mendes has left the department after over nine years service and is apparently working in Dubai.

At a ceremony on Friday 8th April our department welcomed its new acquisition. Main Frame, a sculpture by Leigh Christensen was set in operation by our Deputy Dean of Science in the presence of a small crowd, including the artist himself. The sculpture was first exhibited at the Oedipus Rex Gallery in 1994 and joins two other works held by our department. It represents a circuit for adding two 2-bit binary numbers to produce a 3-bit sum, using ball-bearings to represent bits.

Bob Doran with the sculpture "Main Frame".

The department's annual Gibbons Lecture series was held in April–May. The theme was "Applying Computer Power" and the lectures were:

- Apr 27: Computing outside the box — Prof Ian Foster (University of Chicago).
- May 3: eResearch in New Zealand — Prof Mark Gahegan.
- May 11: Co-operating computers — problems and prospects — Prof James Goodman.
- May 18: Attached Processors for Real-time Applications — Assoc Prof John Morris.

Mark Wilson and Bakh Khoussainov are both on the programme committee for CATS 2012, the main Australasian conference in the area of theoretical computer science. In July Mark attended IJCAI 22 in Barcelona and SING7 in Paris. Michael Dinneen is on sabbatical in North America. Andre Nies recently spent a month hosted at University of Paris VII.

SEMINARS

Rachel Blagojevic "Using Data Mining for Digital Ink Recognition".

Simon Hermann "Accumulation strategies for semi-global stereo matching".

Georgy Gimel'farb "Intelligent Vision Systems NZ: Recent achievements in theory and practice".

Andre Nies "Randomness and Computable Analysis".

Carl Schultz "The 'Space' in DesignSpace".

Gill Dobbie "What have we learnt from deductive object-oriented database research?".

Ulrich Speidel "Why complexity is important".

Andrew Luxton-Reilly "Supporting student-generated free-response questions".

Robert Sheehan "Two hands to rule them all".

Noreen Jamil "Extending Linear Relaxation for Non-Square Matrices and Soft Constraints".

Etuate Cocker "Voice over Internet Protocol for Low Bandwidth and High Latency Networks".

M. Asif Naeem "X-HYBRIDJOIN for Near-Real-Time Data Warehousing".

David Abramson (Monash University) "Assertion based parallel debugging".

Jing Sun "Design Software Architecture Models using Ontology".

Burkhard Wuensche "3D Worlds for Everyone!! — New Technologies for 3D Content Creation".

Kai Fehrs "Wide-angle vision for driver assistance".

Reinhard Klette "Rubberband Algorithms - A General Strategy for Efficient Solutions of Euclidean Shortest Path Problems".

Shuang (Anne) An "Animated 3D Visualization of Stereo and Motion Analysis for EISATS Data".

Mahdi Rezaei "Driver Drowsiness and Distraction Detection Using a 3D Cascade of Classifiers for Head Pose and Eye Status Analysis".

Mark Wilson

DEPARTMENT OF ENGINEERING SCIENCE

Since the last tri-monthly newsletter the University of Auckland held its spring graduation. There was a good turnout by the department to celebrate the 18 graduates of Engineering Science. We also celebrated 3 new doctorates (Dr. Antony Downward, Dr. Eylem Kaya (left) and Dr. Juliet Newson (2nd from right)) and 4 Masters of Engineering (Mr. Charles Moliere, Ms. Emily Clearwater (right), Mr. Gary Nates and Mr. Michael Byrne) from the department. The whole of the department would like to convey their congratulations to the graduating cohort and wish them every success in their future endeavors.

A Fond Farwell: After 30 years of service to the department, Prof. Ian Collins retired on the 5th of July. A lovely farewell lunch was hosted by the Dean of Engineering which welcomed several old faces such as the founding member of the Department of Engineering Science, Mervyn Rosser as well as three past Deans of the faculty.

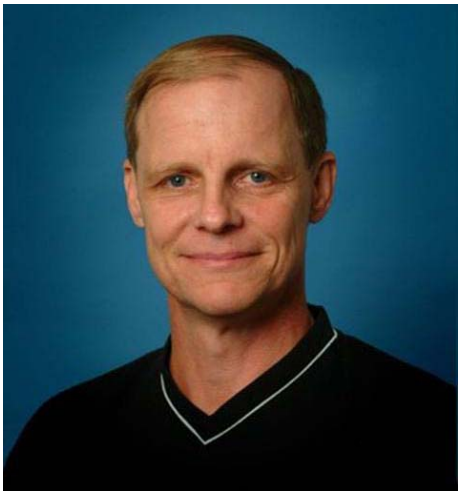
Ian has had a very memorable service in Engineering Science, coming from King's College Cambridge to take up the role as Head of Department

spanning the eighties. He then served as the Associate Dean of Research in the Faculty of Engineering for the following ten years. As well as this, Ian is a brilliant academic, pioneer and a world leader in plasticity theory with its application to mechanical and geotechnical problems. His pioneering work on the application of "shakedown theory" to predict the performance of layered road pavements was taken up by engineering groups in the United Kingdom and Australia.

However, to us he will always be remembered as Ian, a softly spoken unassuming English gentleman, an original thinker interested in a good debate, someone always willing to listen and help. We will miss the quietness of his presence.

Very Sad News: There has been some very sad news of Prof. Andrew Pullan's diagnosis of cancer. In his own words.

"As some of you know I began feeling unwell since returning from my recent trip overseas. I have had a number of tests and I have been diagnosed with metastatic melanoma. The primary/originating site of this cancer has not been found, but they suspect it could well be internal, as I have a polyp in my stomach and no obvious signs anywhere on my skin. The melanoma has spread to my liver and my lungs, and I have nodes in my neck. It was likely developing within me before it appeared on my neck so there was absolutely nothing I could have done to have had it detected before it spread internally."



Despite this Andrew has remained strong and positive towards his recovery. He is now receiving the right balance of pain relief which is giving him back some normality. He has recently received a good treatment plan too. Close colleagues in the Department of Engineering Science have founded a trust to help in his treatment which currently stands at $250,000.

We would like to take this opportunity to ask members of the NZMS to make a donation, if possible to help raise money for Andrew's treatment. There are two ways in which you can contribute which are now outlined.

Currently, there is an online fundraiser at https://www.givealittle.co.nz/cause/AndrewPullan. The generosity of friends and colleagues of Andrew in NZ and beyond has raised more than $24,000 in little more than two weeks. While the "givealittle" site remains active, we would prefer that further donations be made directly to the Pullan Family Trust account (please see details below) to avoid the overhead charges associated with the online site. Thus, you can also donate directly to:

The Pullan Family Trust bank account:
Auckland Savings Bank (ASB) account:
12–3427–0264252–50
ASB Swift code: ASBBNZ2A.

Andrew has also set up a blog so that you can keep up to date with his treatment. This can be found at:
http://andrewsrecovery.blogspot.com/.

We all send our love and support to Andrew, his wife, Patti, and children Zeke and Xanthe during this extremely difficult time.

AWARDS & HONOURS

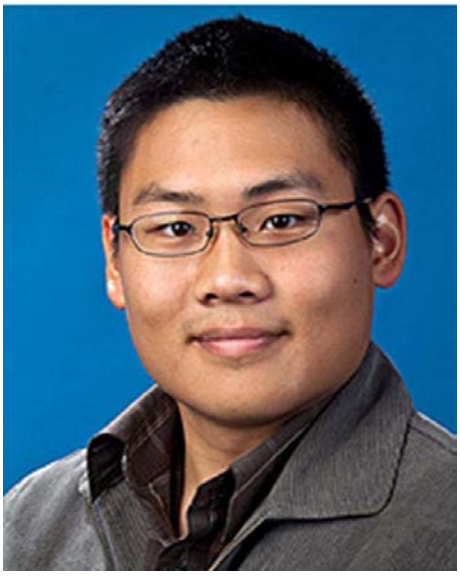
At the 21st International Conference on Multiple Criteria Decision Making (MCDM), held in Finland on 12–17 June, our HOD, Matthias Ehrgott was awarded the Edgeworth-Pareto Award of the International Society on Multiple Criteria Decision Making.

The citation for the award reads:

"As the highest distinction that the International Society on Multiple Criteria Decision Making bestows upon a researcher who, over his/her career, has established a record of creativity to the extent that the field of MCDM would not exist in

its current form without the far-reaching contributions from this distinguished scholar".

This award was established at the 10th International Conference in 1992 and is awarded at most every two years at the International Conferences on MCDM. Some previous winners are Po-Lung Yu, Milan Zeleny, Jyrki Wallenius, Hirotaka Nakayama, Roman Slowinski (co-ordinating editor of EJOR, EURO gold medalist), Jared Cohon (president of Carnegie-Mellon University).



Part IV EngSci student Samuel Cheng is one of three students to receive a Society of Petroleum Engineers (SPE) Southern Asia Pacific Region Star Scholarship, and is the only New Zealander to be awarded the scholarship this year. The committee considered many aspects including academic records, leadership and communication skills, interest in petroleum engineering as a profession, and contributions to the SPE in order to award the scholarship.

VISITORS & SEMINARS

We have had a series of international visitors to the department who have each given some thought provoking talks.

John Sader (University of Melbourne) "Dynamics of Nanomechanical Cantilever Devices in Fluid Environments".

Sven Krumke (University of Kaiserslautern) "The Mathematics of Soccer".

Katharina Beygang (University of Kaiserslautern) "The train marshalling problem".

Jerry Brown (Distinguished Professor at the Naval Postgraduate School (NPS) Operations Research Department, Monterey) "Optimization tradecraft: hard-won insights from real-world decision support".

Marie Schmidt (University of Goettingen) "Optimization problems arising in public transportation".

Keith Parks (Xcel Energy) "Wind energy integration and forecasting".

Charles Unsworth

DEPARTMENT OF MATHEMATICS

The algebraist Ben Martin, currently at the University of Canterbury, will be moving to Auckland to take up a position in our Department at the beginning of 2012.

John Butcher and three Auckland students Annie Gorgey, Angela Tsai and Gulshad, took part in the SciCADE conference at Toronto on July 11–15, where each gave lectures. John Butcher gave an additional lecture at a special minisymposium in memory of the late Jan Verwer of the CWI in Amsterdam. A feature of recent SciCADE conferences has been the awarding of the Butcher Prize. That prize is administered by ANZIAM (NZ branch), and it is awarded for the best student talk at SciCADE. All of the entries were of a very high standard, and Annie Gorgey was highly commended for her talk. On July 12, John Butcher sent to our Department the following message: "On the 'plane from Vancouver to Toronto yesterday I happened by chance to be sitting next to a young NZ woman. She told me, almost inevitably, that she was never any good at Maths at school; but then she went on to say something far from inevitable. It all changed in 2009 when she took a Maths course at UoA, taught by Peter Hughes, as part of her teacher training. She now loves Maths and would like to learn more." Peter Hughes is the Principal Lecturer in the School of Science, Mathematics and Technology Education, in the Faculty of Education (at Epsom Campus).

Marston Conder (NZIMA Co–Director) has been appointed one of three non–European "Associate Partners" in a new EuroCoRE (Centre of Research Excellence), funded by the European Science Foundation, in the priority area of "Graphs in Geometry and Algorithms". In June he attended the International Conference on Graph Theory at Lake Bled (Slovenia) and gave an invited talk in each of the conference's minisymposia on 'Group Actions' and 'Polytopes and Incidence Geometries'. Also he

gave an invited series of lectures on MAGMA and Computational Methods in Algebraic Graph Theory, at the Algebraic Graph Theory Summer School (which was excellent) at Rogla, in the mountains of northern Slovenia. Before leaving for Europe, Marston sorted and packed his office (for the 'decanting' process), filling a total of 11 240–litre recycling and rubbish bins with paperwork from meetings, committees, teaching and research projects accumulated over many years.

Steven Galbraith visited the University of Eindhoven (Netherlands) on July 14–15, University of Oldenburg (Germany) on July 18, and Royal Holloway University of London (UK) on July 20–21. He is looking forward to hosting Prof. Victor Flynn (now at Oxford, but a former student of the University of Otago) for 6 months from 2010 September 4 to 2012 March 3. We hope that everyone will ask Victor to give lectures while he is in NZ. Victor invited Steven to lunch at New College Oxford, where they bumped into Marcus du Sautoy, who has just finished filming a new TV series about mathematics.

A Student research Conference was held here on June 7, organized by Arkadii Slinko. The quality was, without exception, excellent. The talks were well prepared and presented, and a lot of time and thought had clearly gone into them. As Arkadii said, they were better than many of the talks one sees at international conferences. Congratulations to all the presenters, but especially to our prize-winners, who gave talks that were truly excellent.

Pieta Brown (BSc(Hons)) "Sleeping bees and the sun: A Bayesian analysis of bee flight paths after anaesthetic", (Sup. Claire Postlethwaite).

Michael Lockyer (PhD) "Connectedness of generalised inverse limits over compact Hausdorff spaces", (Sup. Sina Greenwood).

Edoardo Persichetti (PhD) "Compact McEliece keys based on Quasi–Dyadic Srivastava codes", (Sup. Steven Galbraith).

Tessa Miskell (BSc(Hons)) "Analysis of students' diagrams when reasoning proportionally about volume", (Sup. Caroline Yoon).

Annie Gorgey (PhD) "Estimate of Gaussian symmetrization at the endpoint", (Sup. Robert Chan).

Dodge Cahan (BSc(Hons)) "Electoral equilibria under scoring rule voting systems", (Sup. Arkadii Slinko).

Shafiq Ur Rahman (PhD) "Performance of some non–symplectic integrators", (Sup. Philip Sharp).

Kerri Spooner (MSc) "The building blocks for learning differential equations", (Sup. Bill Barton).

Tatyana Gvozdeva (PhD) "Weighted Hierarchical Simple Games", (Sup. Arkadii Slinko & Matthew Ryan).

Wenjun Zhang (PhD) "Wave solutions in models of intracellular calcium", (Sup. Vivien Kirk & James Sneyd).

Peter Radonich (PGDipSci) "Model eliciting activities: A way out of the soup", (Sup. Caroline Yoon).

Manfred Sauter (PhD) "The form method for non–accretive operators" (Sup. Tom ter Elst).

Mala Nataraj (PhD) "The importance of exponentiation for a structural understanding of the place–value system and algebraic notation", (Sup. Mike Thomas).

Ali Hameed (PhD) "Roughly–weighted Hierarchical Simple Games", (Sup. Arkadii Slinko).

Lisa Darragh (PhD) "The Mathematics Club: are you a member?", (Sup. Bill Barton & Fiona Ell).

Katie Sharp (PhD) "Cystic fibrosis: a mathematical model", (Sup. James Sneyd).

Catherine Tzu–chien Lin (MSc) "Using technology to support a versatile approach to learning integration concepts", (Sup. Mike Thomas).

First prizes ($1000) were awarded to Lisa Darragh and Tatyana Gvozdeva and second prizes ($750) were awarded to Pieta Brown, Dodge Cahan and Peter Radonich.

In our latest internal PBRF, research grants for 2011 were awarded to the following staff members: Steven Galbraith $2000, Sina Greenwood $5000, Dimitri Leemans $4000, Claire Postlethwaite $2000, Steve Taylor $4000, Shayne Waldron $4000, and Caroline Yoon $2500. And research grants for 2011 were made to the following students: Sunanda Dikshit $2500, Annie Gorgey $2500, Gulshad $2500, Michael Lockyer $2000, Phuong Nguyen $2000, Edoardo Persichetti $1500, Shafiq Ur Rehman $2500, and Angela Tsai $2500.

Recent visitors include Dr Johannes Aastrup (Universität Hannover), Prof. Ferdinando Arzarello (Turin University), Prof. Bettina Eick (Technische Universität Braunschweig), Dr Maria Bruna–Estrach (Oxford University), Dr Julie Clutterbuck (ANU), Dr Heikki Haario (Lappeenranta University of Technology, Finland), Dr Edward Huang

(National Cheng Kung University, Taiwan), Dr Igor Klep (University of Ljubljana), Dr Ville Kolehmainen (University of Western Finland), Dr Paul–Andi Nagy (University of Griefswald), Dr Katharina Neusser (ANU), Prof. Leo Tzou (University of Arizona), Dr Richard Vale (Auckland University), Dr Yingwei Zhang (Yangzhou University) and Dr Chang–An Zhao (Guangzhou University).

Matthew Auger has successfully defended his PhD thesis on "Methods for Investigating Finitely-Presented Groups".

After several months experience of jackhammers being applied to the Mathematics/Physics Block, we have all been "decanted" to temporary sites in some other widely–dispersed buildings, where demolition and construction work are still continuing for our accommodation. We hope to be able to move back into the renovated Mathematics/Physics Block in March 2012.

SEMINARS

Mathew Ryan "Path–independent choice and the ranking of opportunity sets".

Jagir Hussan "Forms, transforms and cardiac biology".

Shikin Adam "Mutual interrogation: thoughts for refinement".

George Havas "Perfect palindromic presentations".

David Gauld "Homeomorphism groups and metrisation of manifolds".

Bettina Eick (Technische Universität Braunschweig) "Classifying groups of prime power order", and "A computer search for simple Lie algebras in characteristic 2".

Maria Bruna-Estrach (Oxford University) "Excluded–volume effects in the diffusion of hard spheres".

Emilio Calius "Artificial muscles: towards soft machines".

Wenjun Zhang "Wave solutions in models of intracellular calcium".

Mark Wilson (Computer Science) "Decisiveness, power, and value".

Ivan Reilly "Topological anti-properties".

Misha Vorobyev (Optometry and Vision Science) "Mathematics and physics of colour vision".

Leo Tzou (Univ. of Arizona) "The Calderon Problem — From the past to the present", & "The inverse Calderon Problem for Schroedinger operators on Riemann surfaces".

Maryam Alavi "A statistical approach to calibration of sensor networks".

Simona Fabrizi "Suggested retail prices with downstream competition".

Anuj Bhowmik "On the core and Walrasian expectations equilibrium in infinite-dimensional commodity spaces".

Richard Clarke "Modelling fluid–structure interactions in microdevices".

Wen Duan "Mathematical modelling of GnRH neurons in mouse brains, and how mathematical modelling helps biology research".

Sergiy Klymchuk (AUT) "Different contexts in teaching mathematical modelling and applications to engineering students: students' attitudes and ifficulties".

Egor Ianovski "Logics of belief change".

Matthew Auger "Computation with infinite families of presentations".

Julie Clutterbuck (ANU) "Proof of the fundamental gap conjecture", and "Gradient and oscillation estimates for parabolic partial differential equations".

Johannes Aastrup (Universität Hannover) "Euler characteristic and index theory", and "Noncommutative geometry".

Igor Klep (University of Ljubljana) "Linear matrix inequalities and operator algebras", and "Connes's embedding conjecture and noncommutative polynomials".

Mark Holmes (Statistics) "A random Random Walk walk".

Shiree Lee "Toddlers as mathematicians".

Catherine Lin "Using technology to support a versatile approach to learning integration concepts".

Garry J. Tee

AUCKLAND UNIVERSITY OF TECHNOLOGY

SCHOOL OF COMPUTING AND MATHEMATICAL SCIENCES

The Mathematical Sciences group at AUT includes students and staff in Applied Mathematics, Computer Science, Analytics (the application of modern quantitative and computing techniques for business, industry and the applied sciences), and Astronomy (utilising the School's two radio telescopes at Warkworth). The Applied Science and the Mathematical Science degrees have been brought together into the same qualification structure so that from 2012 our students will be able to take the full range of BSc, BSc(Hons), and MSc degrees in these areas, in addition to the BMathSc and BMathSc (Hons).

Dr Hyuck Chung attended the 7th International Congress on Industrial and Applied Mathematics (ICIAM) held in Vancouver, Canada from 17 to 22 July 2011. ICIAM is held every four years and one of the largest conferences of mathematics. Over 3,000 mathematicians of all areas gathered to present and discuss their works. Hyuck was a part of a mini-symposia entitled "Advances in wave scattering theories". Researchers from NZ, UK, and Germany took part in this symposia. There were many lively and informal discussions on a variety of wave scattering problems.

Assoc Prof Paul Cowpertwait is working on developing a rainfall and temperature model for use in a decision support system for the Basque Country, Spain. In July, he visited the company (Sener) in Bilbao who are coordinating the project for the Basque Water Agency, and presented the work to a representative of the Basque Country Government. Potential model enhancements under a changing climate were also discussed. Paul then went on to Oxford University to discuss the regionalisation methodology of the rainfall and temperature data for the Basque with Sir David Cox (who was one of the pioneers of the Neyman-Scott stochastic rainfall model that forms the corner stone of the project).

Dr Andrew Ensor has been awarded an NVIDIA Academic Partnership research award to support his work in Computer Graphics and some joint work with the Institute for Radio Astronomy and Space Research. He is also taking some long overdue sabbatical in semester two, visiting colleagues in Europe and Chile.

Dr Robin Hankin appeared on TVNZ's "Fair Go" programme discussing the statistical patterns occurring in New Zealand's Lotto. The programme was aired on 25 May 2011 and provided AUT with considerable exposure to a wide domestic audience. In the past few months, Robin has continued his research collaboration with PME Altham (University of Cambridge), Neil Mitchell (The University of Auckland) and Prof Jim Hall (University of Oxford) in Applied and Computational Statistics. As a result, they have produced several joint publications in prestigious international journals including The Journal of Statistical Software, Tellus B, and Water Resources Research.

Prof Jeff Hunter had an extensive academic tour of Europe. Following a short visit with Prof Simo Puntanen at the University of Tampere, Finland, he gave a talk to the 20th International Workshop on Matrices and Statistics (which also included the 9th Tartu Conference on Multivariate Statistics) held over the period 26 June to 1 July 2011 at the University of Tartu, Tartu, Estonia. This was followed by a talk at PROBASTAT 2011 — The Sixth International Conference on Mathematical Statistics held during 4 – 8 July 2011 at Smolenice Castle, Slovak Republic. Jeff was on the programme committees for both of these aforementioned conferences. His 70th birthday was honoured at Probastat 2011 at the Conference Dinner and as an inclusion in the Conference Publication "2011 Birthday Recognition Booklet" (which also featured the 80th birthdays of Prof Lubomir Kubacek and Prof Gennadij Ososkov). Over the period 12 to 16 July he was an Invited Speaker (with a talk on "The role of Kemenys constant on properties of Markov chains") at the MAT TRIAD 2011 Conference on Matrix Analysis and its Applications, held at the Instituto Politecnico de Tomar, Tomar, Portugal. Prior to his return to New Zealand he spent some time visiting with Prof Jochen Werner at the University of Bonn, Germany.

Congratulations to Associate Professor Sergiy Klymchuk who has just published a paper on averaging of differential inclusions in the rank A* journal: Physica D - Nonlinear Phenomena.

Dr Jeong (Kate) Lee is introducing the new undergraduate paper, an introductory course for the software package, SAS. SAS has been popularly used in industries to handle large data. This paper is equivalent to SAS programming 1 and 2, and will be available in 2012. She presented her work on the threshold selection method for extreme modelling, at the O-Bayes 2011 in Shanghai, China and had a research visit at the University of New South Wales (Sydney) to collaborate with Dr Scott Sisson and Dr Yanan Fan.

Dr Jiamou Liu attended two conferences, "Computability in Europe (CiE 2011)" at Sofia, Bulgaria, from 26 June to 2 July, and "Logic Colloquium (LC2011)" at Barcelona, Spain, from 9 to July 16. In Sofia, Jiamou spoke on "Extract-

ing winning strategies in update games" and in Barcelona, Jiamou spoke on "The isomorphism problem of automatic linear orders and trees". In July, Jiamou also visited Prof Dietrich Kuske at Technische Universitaet Ilmenau (2 – 9 July) and Prof Markus Lohrey at Universitaet Leipzig (16 – 23 July) in Germany. At Ilmenau, Jiamou gave a seminar talk on "Efficient algorithms for some classes of infinite games".

At the beginning of semester one 2011, Ofosuhene Okofrobour Apenteng, Bing (Frank) Huang and Mahmoud Mahmoud enrolled as PhD candidates in Mathematical Sciences in the School. Bing and Mahmoud completed the BMathSc (Honours) programme from AUT, and Ofosuhene Okofrobour obtained a Master of Science in Technology from Lappeenranta University of Technology (Finland). On 21 June, Anuj Bhowmik's D09 was approved and thus his PhD candidature was officially confirmed by the UPB (the review committee consists of his two supervisors Drs Jiling Cao and Andrew Ensor, and two external reviewers Prof David Gauld and Assoc Prof Warren Moors from the University of Auckland). On 29 July, Felipe Eduardo Lillo Viedma successfully defended his PhD (supervised by Drs Andrew Ensor and Jiling Cao). The examination committee recommended an award of degree subject to some editorial amendments. Currently, Felipe is a lecturer at Universidad Católica del Maule (Chile).

SEMINARS

Hyuck Chung (Auckland University of Technology), "Waves and vibrations: air, water, and elastic structures".

Jeffrey Hunter (Auckland University of Technology), "Markov chain properties in terms of column sums of the transition matrix".

Andre Nies (University of Auckland), "Randomness and computable analysis".

Wai Kiang Yeap (Auckland University of Technology), "A computational theory of perceptual mapping: How humans integrate successive views".

Jiling Cao

UNIVERSITY OF CANTERBURY

DEPARTMENT OF MATHEMATICS AND STATISTICS

Semester 1 had been a difficult one this year for the department. The February earthquake not only severely disrupted all teaching but all other normal academic activities as well. The number of visitors and seminar talks are down considerably. Although our building is structurally safe, there are issues with internal walls that prevent us from returning to our offices. The department is spread over several temporary and shared locations and has little control over the rooms we were normally using. Staff are not expected to be back in their offices this year.

On the Monday afternoon of 13 June, after teaching in the first semester had finished, Canterbury was struck by a series of aftershocks, the largest one measuring 6.3. As a precaution the University evacuated both Ilam and Dovedale sites. The campus was closed for three days to allow for assessment of buildings. There were no major injuries on campus or in the Halls and, fortunately, the campus was largely unaffected by the aftershocks. Full operations resumed by Monday 20 June with the start of exams, some of which had to be delayed. However, it is not only earthquakes that affect the university. A snow storm hit Christchurch, and in fact most of the country, on Monday 25 July, which forced the university to be closed again until noon the following day.

Congratulations to Jennifer Brown (Lead PI) and Blair Robertson who have been awarded a 3-year grant worth $1m to develop environmental monitoring in Qatar. The grant, which was internationally competitive, is with Trent MacDonald from WEST Inc, Wyoming and colleagues at Qatar University.

Congratulations to Raaz Sainudiin who is an investigator on the Black Robin project with Melanie Massaro, Anthony Poole and Marie Hale from the School of Biological Sciences entitled: 'A genetics toolkit for the successful management of one of New Zealand's most critically endangered birds', which has been awarded a $24,000 grant from the Brian Mason Foundation to collect and analyze genetic and pedigree data of the Black Robin population in the Chathams that is recovering from the world's most severe bottleneck of one breeding pair.

Clemency Montelle is to be congratulated on the publication of her book called "Chasing Shadows: Mathematics, Astronomy and the Early History of Eclipse Reckoning" by Johns Hopkins University Press in April. It explores the ways in which four major cultures of the ancient world — the ancient Near East, ancient Greece, India and the Islamic Near East — used mathematics to model and predict eclipses. The book also looks at the scientific discoveries these societies made and how their ideas spread between cultures.

Congratulations to Peter Smith who has been awarded the College Research Award for 2010.

On 14 April at Government House, Wellington, Professor Emeritus Roy Kerr, was invested by Sir Anand Satyanand, Governor General, as a Companion of The New Zealand Order of Merit (CNZM) for services to Astrophysics. Roy took up the Chair of Mathematics at Canterbury in 1971, on his return from the University of Texas, Austin, and remained there until his retirement in 1993. For ten of those years he was also Head of Department. Charles Semple represented the Department of Mathematics & Statistics at the investiture and the following luncheon, where he gave a speech on behalf of the department.

Best wishes go to Maarten and Ali McKubre-Jordens on the birth of their first child on Anzac Day, a son named Søren Nikolai McKubre-Jordens.

In June the department welcomed Elena Moltchanova, who took up a continuing senior lecturer position. Elena came from the National Institute for Health and Welfare, Helsinki, Finland. Her research interests are in applied Bayesian spatio-temporal modeling, epidemiology and modeling of extreme events.

Ben Martin announced his resignation. Ben is leaving the department at the end of the second semester to move to the University of Auckland.

CONFERENCES, WORKSHOPS, VISITS & VISITORS

A joint Mathematics-Philosophy retreat for UC and visiting staff and students, for a weekend of academic discussion, fellowship and fresh air, took place 27–28 May at the University's Kaikoura Field Station. The trip was packed, and the scholarly fare included ten talks on various topics including constructive mathematics, history and philosophy of mathematics, mathematics education, experimental statistics, imaging and probability. One talk included some very hard sums consisting of tequila, shot glasses and dice — all in the name of research, of course!

David Wall attended the 2011 Casablanca International Workshop on Mathematical Biology held at Hassan II University in Casablanca, Morocco, 20–24 June. During his sabbatical David spent time at Chalmers University of Technology in Goteborg, Sweden.

Phil Wilson is on sabbatical in the second half of the year. He recently spent a week at the American Institute of Mathematics in Palo Alto, participating in a neurobiology workshop.

Richard Brown gave a talk entitled "Using reduced-order models and waveform relaxation to solve cerebral blood flow auto-regulation DEs on a large binary tree network", at the 24th Biennial Conference on Numerical Analysis, University of Strathclyde, 28 June – 1 July 2011.

Rua Murray gave a talk entitled New Computational Methods for Open Dynamics at the SIAM conference on Applications of Dynamical Systems in Utah from 22–26 May 2011.

The department welcomed its latest Erskine visitor, Victor J Katz, Emeritus Professor of Mathematics at the University of the District of Columbia. He was hosted by John Hannah and Clemency Montelle. Victor's interests are in the history of Mathematics and in its use in teaching. He is the author of a well-known textbook "A History of Mathematics: an Introduction", the 3rd edition of which appeared in 2008. He is also the editor of "The Mathematics of Egypt, Mesopotamia, China, India and Islam: A Sourcebook", which was published in 2007. Professor Katz has directed two NSF-sponsored projects to help college teachers learn the history of Mathematics, how to use it in teaching, and how to involve secondary school teachers in writing materials using history in the teaching of various topics in the high school curriculum. Victor was also the founding editor of Loci: Convergence, the MAAs online magazine in the history of Mathematics and its use in teaching, serving from 2004 to 2009.

SEMINARS

Pipat Wongsaart (Monash University) "A Semiparametric Autoregressive Conditional Duration Model".

Anna MacDonald (University of Canterbury) "Threshold estimation using a flexible extremal mixture model".

Travis Horton (University of Canterbury, Geological Sciences) "Orientation during Vertebrate Migration: how Maths and Stats can help solve a 3,000 year-old problem".

Dennis Prangle (Lancaster University) "Summary statistics for Approximate Bayesian Computation".

Günter Steinke

INDUSTRIAL RESEARCH LIMITED

Shaun Hendy has continued his radio series with Bryan Crump on Radio NZ Nights, this year focusing on everyday physics and asking important questions such as what happens when you put a CD in a microwave. Shaun is currently writing a book with Sir Paul Callaghan based loosely on his blog "A Measure of Science" (http://sciblogs.co.nz/a-measure-of-science), which will attempt to make the case for greater investment in science in New Zealand. Shaun also attended the 2nd Australia New Zealand Micro and Nanofluidics meeting in Sydney in April, giving a talk on nanofluidics using carbon nanotubes.

Dion O'Neale went to Melbourne for 10 days to visit Will Wright at La Trobe University Maths department and to work on a joint project on numerical methods for financial PDEs. And he's been out and about talking to schools about careers in mathematics. Dion has also been organizing a joint seminar series with Weta Digital in Miramar. The first of these was given by Eugene D'Eon on "Scattering Photons at Weta Digital: Simulating the Appearance of Skin and Hair". This talk proved to be extremely stimulating, and many of us were surprised by the level of mathematical physics needed to correctly render skin, hair and fur, and by the fact that such research is being carried out at Weta. It seems likely that some IRL mathematicians and physicists will continue to work with Weta in this area.

Bridget Ingham gave an invited talk at the 27th Society of Crystallographers in Australia and New Zealand (SCANZ) conference in Rotorua at the end of April, entitled "In situ synchrotron X-ray scattering studies of metal nanoparticle formation and coalescence".

John Burnell has started a new modelling project with Mighty River Power to extend the Tough2 geothermal simulator and develop a model of the Rotokawa geothermal system. This follows the successful development of a model of the Ngatamariki geothermal system, where construction of a 80 MW power station will start soon.

Krista Steenbergen, Dmitri Schebarchov and Nicola Gaston attended WATOC (the World Association of Theoretical and Computational Chemistry) in Santiago de Compostela, Spain. Krista presented a poster on "Superheating of Gallium Clusters", Dmitri a poster on "The Electronic Structure of Metalloid Gallium Clusters" and Nicola gave a talk on "Coupled-cluster calculations for Zinc Clusters".

Nicola also attended the ISMPC(International Symposium on Monolayer Protected Clusters) in Jyvaskyla , presenting a poster "Throwing Jellium at Gallium".

Warwick Kissling has been awarded an International Mobility Fund grant to visit the Deutsches GeoForschungsZentrum (GFZ), in Potsdam for three weeks in September, to work on models of hot springs with Mauro Cacace.

Two new French interns, Simon DelTombe and Arnaud Kammler have arrived from Bordeaux to work with Warwick and John on some geothermal problems. They will be here until Christmas. Our third intern from France, Bastien Lefevre is nearing the end of his time at IRL. He recently gave a seminar "Wetting and dewetting at the nanoscale: thin films, nanopores and hydrophobes".

And lastly, we had a visit from Olumide Adisa, from the Nanomechanics group at the University of Adelaide, who gave a seminar entitled "A mathematical investigation of methane adsorption on carbon nanostructures".

Warwick Kissling

MASSEY UNIVERSITY

INSTITUTE OF FUNDAMENTAL SCIENCES (MANAWATU)

In June we farewelled Mike Hendy, who has retired from Massey to take up a research-only position at the University of Otago. Mike was at Massey for over forty years, and will be sorely missed. Our loss is very much the University of Otago's gain!

We congratulate Luke Fullard, who has submitted his PhD thesis on a shock-tube model for the

initiation of a hydrothermal eruption. Luke's supervisor was Tammy Lynch.

We will soon welcome James Wang from the University of Canterbury, who will be joining us to do a Phd under Tammy Lynch. James will be modelling rumen cow, with Bruce van Brunt (Massey) and David Pacheco (AgResearch) as additional supervisors.

Chris Tuffley has just returned from the 52nd IMO, in Amsterdam. New Zealand had another very successful year, winning two silver medals, two bronze medals, two honourable mentions, and placing 29th equal of 101 countries. For more details see an article elsewhere in the newsletter.

Theses: Luke Fullard, "Modelling the initiation of a hydrothermal eruption — the shock-tube model".

SEMINARS

Josh Collins (Massey University) "Clustering character data into differing tree topologies".

Fu-Guang Cao (Massey University) "Colliding two photons — the new QCD frontier".

Christopher Tuffley (Massey University) "Intrinsic linking of n-complexes".

Paul Gardner (University of Canterbury) "Bioinformatic approaches to functionally characterise RNAs".

Mike Hendy (Massey University) "Connecting the Sequences".

Tony Signal (Massey University) "A short visit to the Large Hadron Collider".

Christopher Tuffley

INSTITUTE OF INFORMATION AND MATHEMATICAL SCIENCES (ALBANY)

The IIMS Teaching Award, for sustained excellence in teaching, was this year presented to mathematician Frederick Lam. His record over several years in teaching mathematics, especially in the bridging and first-year papers, has been remarkable; the students have nothing but the highest of praise for his effectiveness.

The second annual IIMS Research Symposium/ Pizza Afternoon, 'to aid cohesion across the institute and help introduce new PhD students to the research culture', was held on Friday 13th May. Academic staff and PhD students in mathematics, statistics, computer science and information technology gave one-minute presentations on their research. So diligent were the speakers at obeying the time limit that the timekeepers only had to terminate one talk for going overtime, and the session finished 20 minutes before the pizzas were scheduled to arrive. A suggestion to hold an impromptu staff meeting was rejected and it was decided to open the bar early, instead. It has been proposed that talks may be extended to two minutes for next year.

As part of its aims for community collaboration in the widest sense, the Centre for Mathematics in Industry (CMI) is helping a Thai university, King Mongkut's Institute of Technology at Ladkrabang (KMITL) in Bangkok, as it begins to establish an industrial mathematics (IM) programme. Invited by their Centre for Industrial Mathematics (CIM), Robert McKibbin visited KMITL for a week in June. Under the heading "Mathematical Modelling for Industry - Getting Started", he gave presentations on industrial mathematics, had discussions with mathematics academics, and led a series of workshops on mathematical modelling with postgraduate students and applied mathematics staff. The CIM is planning a follow-up IM workshop to take place in Bangkok during March next year, with further participation by members of our CMI.

Robert McKibbin attended IUGG 2011 (International Union of Geodesy and Geophysics 4-yearly congress) in July and gave a talk on modelling of volcanic ash dispersion in the volcanology section, and a poster (co-authored by Amjad Ali and Winston Sweatman) in a session on hydrology and tracer transport.

Carlo Laing attended the SIAM Conference on Applications of Dynamical Systems in Snowbird, Utah in May, giving the invited presentation "A Reduced Model for Binocular Rivalry". Carlo is on sabbatical in Princeton until the end of the year.

Mick Roberts visited Prof. Kerry Landman at the Department of Mathematics and Statistics, University of Melbourne, April 12 - 15. While in Melbourne he also caught up with Stephen Davis at RMIT and Jodi McVernon at the Melbourne School of Population Health, attending one of their research meetings. He presented a seminar at Melbourne University (April 12) on "Threshold quantities for epidemics". He then visited the Institute for Mathematical Sciences, National University of Singapore, April 18 to May 20, repeating the Melbourne seminar and presenting a paper on "Epidemic models with uncertainty" as part of the Workshop on Discrete Mathematics and Probability in Networks and Population Biology. The prin-

cipal contact in Singapore was Prof. Andrew Barbour, previously at the Institut für Mathematik, Universität Zürich. After a brief return to New Zealand, he attended the European Conference on Mathematical and Theoretical Biology - ECMTB 2011 in Krakow, Poland, and presented a contributed paper. He then visited Utrecht University to continue collaborative research with Prof. Hans Heesterbeek, and got home in time for the start of semester 2.

In April Alona Ben-Tal visited Prof. Yannis Kevrekidis in Princeton for 8 days and attended the Experimental Biology meeting (EB2011) in Washington DC. In May she attended the SIAM conference on applications of dynamical systems where she organised a minisymposium and presented a talk entitled: "Multi-level modeling of the respiratory system".

Graeme Wake attended the International Conference in Industrial and Applied Mathematics in Vancouver in mid-July and visited other places in North America (including Alaska) over the following two weeks. He presented a paper on his National Research Centre for Growth and Development (NRCGD) project on fetal growth modelling.

Ms Kerri Spooner, from Long Bay College, is spending the second half of this year working in the Centre for Mathematics-in-Indusry while holding a RSNZ Secondary Teachers Fellowship. She will participate in some of the current projects within the Centre to experience "mathematics-at-work" among other things. She was the only such RSNZ Fellow in Mathematics in 2011.

SEMINARS

Amjad Ali, "Tracer transport in porous media: models for stratified groundwater aquifers".

Arno Leist, "Data-parallel simulation and analysis of complex systems with irregular graph structures".

Robert McKibbin, "Aerosol transport models: effect of dispersion coefficients on predicted ground deposits".

Shaun Cooper

UNIVERSITY OF OTAGO

DEPARTMENT OF MATHEMATICS AND STATISTICS

We are very pleased to welcome two new academic staff members, Prof Mike Hendy and Dr Lisa Clark, to the Department. Mike and Lisa's profiles can be seen in the 'New Colleagues' section.

Since the last Newsletter we have farewelled Steffen Klaere and Jamie Sanderlin, two Postdoctoral Fellows.

Astrid an Huef gave a plenary lecture at the Great Plains Operator Theory Symposium, one of the leading annual North-American conferences in operator theory. She spoke about higher-rank analogues of the Leavitt path algebras, which are algebras associated to directed graphs. There are striking connections between the properties of the algebra and the underlying higher-rank graph. The conference was held at Arizona State University in May.

Florian Beyer spent two weeks in Argentina, first, as an invited speaker at the conference "Grav 11" in LaCumbra, and second, as a visitor of Prof. Reula at FaMAF (University of Cordoba). Prof. Reula will visit our Department in September 2011 for two weeks.

Peter Fenton gave a talk on reverse Denjoy theorems, joint work with John Rossi, at the workshop on normal families, meromorphic functions and value distribution theory, a subset of a wider conference on function theory and relativity in Acre (Akko), Israel, 20–27 May. Old Acre is a fortified port city, surviving parts of which date from the Crusader period; the weather was heavenly. John Rossi visited the Department to work with Peter for two weeks in June–July.

Jörg Frauendiener spent a 3-month sabbatical at the Albert-Einstein-Institute in Potsdam, Germany. He spent the time in a very fruitful atmosphere. The hospitality of the AEI made it even possible for PhD student George Doulis and post doctoral fellow Ben Whale to join him for three weeks there.

While in Europe he took the opportunity to visit ZARM (Centre for applied space technology and micro gravity), a research institute attached to the University of Bremen. This institute is distinguished by the "Fallturm", a drop tower of 150 meters in height, from which entire experiments are dropped in a vacuum tube in order to study the effects of zero gravity during the drop time of about three seconds. While most of the experiments are concerned with applied topics such as e.g. crystal growth in zero gravity they also perform experiments of a more fundamental nature like the study of the behaviour of Bose-Einstein condensates in free fall.

Another visit took him to Prague, one of the most beautiful cities in Europe. He gave a talk

on relativistic elasticity in the seminar of the Relativity group of Prof. Bicak in the Department of Theoretical Physics.

Visitors over the last few months have been Poul Hjorth from the Technical University of Denmark, Ian Lisle from University of Canberra, Greg Reid who is spending several months in Dunedin while on leave from University of Western Ontario and John Quigg from Arizona State University.

Seminars

John Bardsley (The University of Montana) "Inverse problems: where mathematics, computation and statistics meet".

Phil Bremer (Department of Food Science) "Correlating diverse data sets: how season, gender, diet and location impacts on the sensory quality of sea urchin roe and other stories".

Jörg Hennig "Universal properties of distorted Kerr-Newman black holes".

Peter Green "Robust climate reconstruction".

Robert Aldred "Mathematics in plain English: Some important problems in Graph Theory readily explained (if not necessarily solved) Inaugural Professorial Lecture".

Martin Krkosek (Department of Zoology) "Modelling a marine host parasite system: sea lice and salmon population dynamics".

Shirley Pledger (Victoria University of Wellington) "Fuzzy ecological communities: clustering and pattern detection using mixtures".

Ross Ihaka (University of Auckland and the R Foundation) "R Project: a brief history and thoughts about the future".

Richard Laugesen (University of Illinois at Urbana Champaign) "Eigenvalues of the Laplacian on triangles".

Murray Effort (Department of Zoology) "Likelihood-based estimation of population density and the case of the horny toad".

Peter Fenton "Problems related to the Denjoy conjecture".

David Fletcher "A new method for estimating over-dispersion in count data".

Peter Herbison (Preventive and Social Medicine) "Analysis of count data: implications for meta-analysis".

Jacquelyn Parente (University of Canterbury) "Kernel density estimates to diagnose severe sepsis in critical care patients".

Jimmy Zeng "Bootstrapped Model-averaged Confidence Interval".

Rachel Fewster "Where did you get that rat? Using genetics to study the origins and swimming patterns of invasive pests".

Iain Raeburn "How the natural numbers freeze" (Inaugural Professorial Lecture).

Darryl MacKenzie (Proteus Wildlife Research Consultants) "Modelling the data we wish we had: a non-Bayesian approach".

Poul Hjorth (Department of Mathematics, Technical University of Denmark) "Applied Mathematics Applied: European Study Groups with Industry".

Catherine Grueber (Department of Zoology, University of Otago) "Multimodel inference in ecology and evolution: Navigating AIC, GLMM and inbreeding".

Steven Miller (Computing & Mathematical Sciences, University of Waikato) "Reconstruction of a Demographic Expansion from Multiple Sources of Evidence".

Ian Lisle (Faculty of Information Sciences & Engineering, University of Canberra) " Extending Lie Symmetry Analysis of PDE".

Tilman Davies (Massey University) "Continuous space-time modelling in epidemiology".

400-LEVEL MATH STUDENT PROJECT PRESENTATIONS

Eman Alhassan "Dedekind Domains"

Boris Daszuta "Spectral Methods, Wave Equations and the 2-Sphere"

Richard McNamara "Parseval Frames"

Sam Primrose "Leavitt Path Algebras"

Lenette Grant

UNIVERSITY OF WAIKATO

DEPARTMENT OF MATHEMATICS

A large turnout was evident at the retirement function held in early June to celebrate Kevin Broughan's contribution to the Department, the University, and

the mathematical community over a 40 year period. Colleagues from across the whole University, former graduate students, as well as a number of colleagues from the University of Auckland were in attendance. There was plenty of laughter and reminiscing during the socialising and the speeches. Most of us were not aware that years ago, Kevin and some students did some unauthorised trench digging in order to get an Internet connection between the Computer Centre and his office.

Tim Stokes has now finished a three-year term as Chairperson of Department. His replacement is Ian Hawthorn who took up the reins of power on July 1.

Recruitment for the two positions in the Department is nearing completion. On-campus interviews of the short-listed candidates will take place before mid-August with decisions to be made shortly afterwards.

Nick Cavenagh recently turned from a trip to the U.S.A. While there, he visited Dr Abdollah Khodkar at the University of West Georgia. They worked on a problem involving signed edge domination numbers and another problem on super edge graceful labelling (both areas of graph theory). Nick made a stopover in San Francisco and experienced the excitement of being in the vicinity of a gang shoot-out.

Sean Oughton attended the annual summer meeting of the American Institute of Aeronautics and Astronautics (AIAA) as an invited speaker. The venue this year was Honolulu, Hawaii. The volcanic ash from Chile meant his outbound flight was canceled the day before departure. Fortunately, the travel agents were able to get him on an alternative flight, even at such short notice. 1200 attendees giving 1100 talks led to an interesting week. And the near perfect weather was a VERY welcome change from the particularly wet winter we've been having in the Waikato.

Ernie Kalnins attended the XV International Conference on Symmetry Methods in Physics (SYMPHYS-XV). This conference was held in two parts. He attended the first part which was held in Dubna, Russia in mid-July. The conference was dedicated to the memory of the previous Director of the Joint Institute for Nuclear Research in Dubna. Ernie gave an invited talk on "Contractions of basis functions on the two sheeted hyperboloid" based on joint work with his collaborators G. S. Pogosyan and P. Yahkno.

Stephen Joe has just returned from attending the 7th International Congress on Industrial and Applied Mathematics held in Vancouver. Besides giving a presentation, he was able to collaborate on some work with his former PhD student, Dr Frances Kuo.

Seminars

S. Galbraith (University of Auckland) "Euclid's algorithm, continued fractions, factoring and the approximate GCD problem".

Stephen Joe

FEATURES

NEW COLLEAGUES

MIKE HENDY

Professor Mike Hendy, who has recently retired from the chair of Mathematical Biology at Massey University in Palmerston North, has joined the department for a fixed term from July. This appointment will give Mike the opportunity, in partial retirement, to focus more on his research in molecular phylogenetics and work closely with Assoc Prof David Bryant who joined the department in 2010. Mike will continue supervision of a number of PhD students continuing at Massey, with two students, Atheer Matroud and Josh Collins joining Mike in Dunedin.

Mike has been a long time member of the Society, and was NZMS newsletter editor from 1994–8, and member of the Council 1993–8. In 2001 he coordinated the team that led to the establishment of the Allan Wilson Centre for Molecular Ecology and Evolution, and its success in being one of the original five (including NZIMA) Government funded Centres of Research Excellence. He was the AWC's founding Executive Director 2001–2009 and led the AWC through the refunding round in 2008. He was also a PI and on the Governance Board of NZIMA.

LISA CLARK

Lisa Orloff Clark has recently been appointed Lecturer of Pure Mathematics at the University of Otago. Lisa obtained her PhD from Dartmouth College (USA) in 2004 and has come to Otago from Susquehanna University (USA) where she was an Associate Professor of Mathematics. Her chief research interests are in the area of functional analysis and she specialises in operator algebras. She is joining the newly formed research group of Operator Algebraists here at Otago.

INTERNATIONAL MATHEMATICAL OLYMPIAD 2011

This year's IMO team maintained the high standard set by last year's, placing 29th equal of 101 countries (a percentile ranking of 72%, our highest ever), and bringing home two silver medals, two bronze, and two honourable mentions. The team and their results were as follows (individual scores out of 42):

Student	Score	Percentile	Award
James Allen (Kristin School)	27	90.41	Silver medal
Arun Shanmuganathan (Auckland Int. College)	22	80.11	Silver medal
Robert Zhang (Auckland Grammar School)	21	74.42	Bronze medal
Malcolm Granville (Auckland Grammar School)	17	60.75	Bronze medal
Tom Yan (Auckland Grammar School)	14	46.36	Hon. Mention
Benedict Morrissey (Garin College)	13	44.05	Hon. Mention
Team result: 29th of 101 countries	114	72.00	

James' score of 27 was only one point off the gold medal boundary, making this our closest brush with gold since Simon Marshall won New Zealand's only gold medal in 2002; and Robert Zhang was also only one point away from silver. Putting aside last year's record all-medal finish, this is also the first year in which every member of the team has received at least an honourable mention.

The Olympiad was held this year in Amsterdam over 12–24th July, and the team was accompanied by Ilya Chevyrev (University of Auckland) as Deputy Leader, Stephen McConnachie (Linwood College, Christchurch) as Team Manager, with me as Team Leader. We gathered at Grafton Hall (University of Auckland) over the weekend of 9–10 July for two and a half days of pre-departure training, before flying out from Auckland airport on the afternoon of Monday 11th July. After a long but uneventful journey we arrived in Amsterdam, where we were met by Dutch leader Johan Konter. With Johan's help the team, Ilya and Stephen set off on the first leg of their journey to the Frisian island of Texel (pronounced "tessle"), where they would spend four days in joint training with the Dutch team while Johan and I attended the IMO jury meetings to help choose the problems for the competition.

Left image: Ilya Chevyrev and I read the team's scripts, in preparation for co-ordination. Right image: Robert Zhang, Ilya Chevyrev, Tom Yan and Malcolm Granville discuss the solution to a problem from a mock IMO during training at Grafton Hall.

The jury meetings took place at a hotel near Eindhoven that had once been a nunnery. This featured several large courtyards and many stained glass windows, including a very large and beautiful window that took up the entire back wall of the jury hall. It was really quite a pleasant place to be — which was good, because I barely had a chance to go outside for the first few days I was there! For much of this

time Johan and I worked together closely.

Once the six problems had been selected, and translated into the over 50 languages represented at the IMO, we had a trip to Amsterdam and back for the opening ceremony on Sunday 17th July. The traditional parade of teams was done this year by continent, with a troupe of acrobats keeping things lively, and Australian leader Ivan Guo and I were tickled to find that collectively we made up "Oceania". This naturally set the stage for a battle for top team in Oceania, a battle which was rather more closely fought this year than usual: we were only two points behind their total of 116, and although they also had a higher medal count, we can claim a moral victory of sorts, for having a higher top score (27 to their 22) — especially since the IMO is officially an individual competition!

The contest then took place over the next two days, and will surely be remembered for two things. Firstly, for being the first time in many years that there were two combinatorics problems instead of two geometry, with moreover no geometry among the two "easy problems" — instead, the only geometry was Problem 6, the hardest. Secondly, for the beautiful "windmill problem", due to Geoff Smith of the UK, which was chosen in the final showdown between combinatorics and geometry by a vote of 47 to 46:

> **The "Windmill" Problem (IMO 2011 Problem 2).** Let $\mathcal{S}$ be a finite set of at least two points in the plane. Assume that no three points of $\mathcal{S}$ are collinear. A windmill is a process that starts with a line ℓ going through a single point $P \in \mathcal{S}$. The line rotates clockwise about the *pivot* P until the first time that the line meets some other point belonging to $\mathcal{S}$. This point, Q, takes over as the new pivot, and the line now rotates clockwise about Q, until it next meets a point of $\mathcal{S}$. This process continues indefinitely.
>
> Show that we can choose a point P in $\mathcal{S}$ and a line ℓ going through P such that the resulting windmill uses each point of $\mathcal{S}$ as a pivot infinitely many times.

This was chosen as one of the two "medium" problems, but was surely harder than the jury and the Problem Selection Committee had thought: compared to Problem 3 (one of the two "hard" problems) there were just as many scores of 0, but fewer than half as many perfect scores of 7. This and the "missing" easy geometry may well have upset the fortunes of many contestants, who were counting on the "usual" two geometry.

With the contest sat, the team could relax and go on excursions — touring the countryside near Amsterdam by bicycle, and visiting The Hague and the Escher Museum — while Ilya and I got to work marking and co-ordinating their scripts. This occupied the next two days, and it was only then that we got a chance to venture away from the hotel and explore Amsterdam. The IMO is no holiday! My sister is living in Munich at present, and was able to pop up and join me for this last weekend in Amsterdam, as we explored its network of canals and bridges, and admired its distinctive architecture.


Left image: Koos Verhoeff with some of his mathematical art, during a jury excursion. Right image: The team exploring Amsterdam with our guide, Marlisa Hommel (right).

The medal boundaries are frequently within one or two points of 14, 21 and 28, and with students near each of these numbers we were extremely anxious to know just what they'd be... Alas, they weren't as kind to us this year as last: at the final jury meeting the next day it was clear that they should be set at bronze 16, silver 22, and gold 28. This meant Robert and James each missed out on silver and gold respectively by just one point — so close, so close! But nevertheless a fantastic achievement all round.

Our thanks go to the Royal Society of New Zealand, Science OlympiaNZ, the New Zealand Association of Mathematics Teachers, the New Zealand Institute of Mathematics and its Applications, and the University of Auckland for their support in getting the team to Amsterdam. Full results can be found at imo-official.org, and reports from the IMO as it unfolded can be found on the New Zealand Mathematical Olympiad Committee website, www.mathsolympiad.org.nz.

The team after the Closing Ceremony. From left: Tom Yan, Robert Zhang, James Allen, Ilya Chevyrev (deputy leader), Arun Shanmuganathan, Malcolm Granville, Benedict Morrissey.

Chris Tuffley

CONFERENCES

CONFERENCE ANNOUNCEMENTS

NEW ZEALAND MATHEMATICAL SOCIETY COLLOQUIUM

6 - 8 December, 2011
University of Auckland/AUT

We are proud to have six outstanding plenary lecturers.

- John Mason (Open University) "Making Connections: shadows, crossed ladders, couriers, Ceva and parallel sums".
- Kiran Kedlaya (San Diego/MIT) (Number theory/Algebraic geometry).
- Graeme Wake (Albany) ANZIAM Lecturer.
- Alan McIntosh (ANU) (Harmonic Analysis/PDEs).
- Charles Semple (Canterbury) NZMS Research Award winner.
- Hinke Osinga (Auckland) (Dynamical systems).

An approximate timetable for the event is available from the conference webpage. The registration and abstract submission portal will be open around mid-September. The accommodation booking service will also be online from mid-September.

We remind everyone that the deadline for posters and abstracts is Friday 21 October. We do not guarantee that every abstract will be accepted, but we hope to be able to accept most of them.

The deadline for conference registrations is Monday November 21st, 2011. After that date there will be a late fee.

There will be prizes for the best student talks and the best student posters. Students are strongly encouraged to attend the conference and to present a talk or poster.

For the most up-to-date information, please keep checking the webpage:

http://nzmathsoc.org.nz/colloquium/home.php.

Steven Galbraith

NUMBER THEORY SATELLITE MEETING

There will be a Number Theory Meeting at the University of Auckland on Monday December 5 2011 (the day before the NZ Math Colloquium begins). The speakers will include:

- Florian Luca (Universidad Nacional Autnoma de Mxico)
- Victor Flynn (Oxford)
- Kiran Kedlaya (San Diego/MIT)
- Alina Bucur (MIT)
- Shaun Cooper (Massey)

More details will be available on the NZ Math Colloquium website. If you have any further questions then please contact Steven Galbraith (s.galbraith@auckland.ac.nz).

CONFERENCE AND MAGMA WORKSHOP ON: 'SYMMETRIES OF DISCRETE OBJECTS'

Date: 13–17 February 2012

Venue: Rydges Lakeland Resort Hotel, Queenstown, New Zealand

Web: http://www.math.auckland.ac.nz/~conder/SODO-2012/

Contact: Marston Conder (m.conder@auckland.ac.nz)

This event will be a combination of a research conference on symmetries of discrete objects (such as graphs, maps/dessins, polytopes, Riemann surfaces and other complexes), and a MAGMA workshop, including some instructional courses (well suited for graduate students) on the MAGMA package and its capabilities (especially for handling discrete structures and their automorphisms).

The aim of the conference is to bring together researchers working in various inter-related fields, introduce their approaches and discoveries to one another, and to promote joint research in and between these fields. To achieve this we will have a small number of keynote talks, several contributed talks, at least one open problem session, and ample time for discussions and problem solving. Anyone with interest in automorphisms of discrete structures is welcome to consider attending.

NZMS COLLOQUIUM ANZIAM POSTER COMPETITION: SOME IDEAS FOR POSTER PRESENTATIONS

Posters are a useful alternative to talks and written articles as a means of communicating research and sometimes are more appropriate and effective. Many conferences include poster presentations and there is often an opportunity to contribute both a talk and a poster. Apart from this chance to present research, there is frequently the encouragement of a prize. After presentation at a conference, the poster remains as a continuing resource for explaining your work. Even with posters directed towards a scientific audience, I have found them helpful for explaining what mathematicians do to a more general audience.

Posters were introduced to the New Zealand (NZMS) Mathematics Colloquium in 2009, when the Colloquium was held at Massey University's Albany Campus for the first time. In the 2010 NZMS Colloquium at the University of Otago, ANZIAM instituted an annual prize to further encourage participation. This prize is for the best poster by a student or early career researcher. I had the fortune of being a judge of the entries.

This article considers poster presentations with a focus on the context of the prize at the NZMS Colloquium. It aims to complement the earlier article "How do I win the Aitken prize: what is looked for in student mathematics presentations?" (NZMS newsletter 103, pages 27-28, August 2008). Hopefully the following thoughts will help any presenter although, unfortunately, as with the earlier article, they cannot be guaranteed to assure a prize.

PRODUCING A POSTER

I produced my first research poster in 1988, as two A3 sheets of ordinary paper which could be pinned to a board side by side. This format of poster is still possible, however, many posters now tend to be printed and laminated as a single (usually A0) sheet.

The easiest way to begin is to use an existing poster as a template and to modify it. A number of poster templates can be found on the internet. Recently, I have used a LaTeX template handed to me by colleagues in computer science. Other people use Powerpoint for the construction. Both packages can be used to produce good (or poor) posters. As when producing slides for a talk, Powerpoint is simple to use in that you can drag and drop items to new positions very easily and you can see immediately what it looks like. LaTeX needs to compile (sometimes with a stream of errors) but a good LaTeX template will help with the placement and formatting of items. It is also easier to convert LaTeX source text of a poster to that of a LaTeX article or vice versa.

With the variety of options available for constructing a poster, I have found myself getting stuck at this early decision. As an author, choose a method quickly so that you get on with adding the actual mathematical content.

DOES IT LOOK PRETTY? IS IT READABLE?

Posters are visual. First impressions are important. Will the poster look good from a distance and attract readers? Blank space providing a margin around items in the poster, and around the outside of the poster itself, can help make these easier to look at and read. A poster is different from an article or a talk in that its space and text length is much more tightly constrained. The layout and appearance of items on the poster should be deliberate. The poster should not look as if everything has just been crammed in.

Pictures really help a poster. They both look attractive and can convey some ideas more quickly and directly than text. Text itself needs to be at a font size where it is comfortable to read it. I use the guideline that the poster should be readable when reduced and printed at A4 size. A4 printouts are also valuable as handouts so that the poster is remembered afterwards.

Don't be afraid of being adventurous. There must be some mathematical content but there is considerable flexibility in how it is presented.

THE MATHEMATICAL CONTENT

Similar points apply to the content of a poster as for a talk or article. The intended audience should be able to read and follow the key points in the poster. Do not assume too much specialized knowledge. For the case of the New Zealand Mathematics Colloquium, there are people from a wide range of mathematical backgrounds. It is good to present the context of your work. If your research arises out of an application then describing this may work well for the poster but don't forget to include some mathematics!

Again, as with talks, posters are limited for space. It may not be possible to include all the details of a mathematical argument. Try to show the general line of reasoning and key features. Bullet points and tables may help. Try to keep the reading time within reasonable bounds.

THE POSTER SESSION

The display of posters at conferences varies. Sometimes they are posted for the whole duration of the conference (ideally where everyone has their coffee breaks), they may even appear online, but the display may be more limited due to time and space constraints. There may be specific poster sessions where authors are encouraged to be available for answering questions and discussing the content of their posters. A key practical challenge for organisers with these is ensuring that there is just enough (and not too much) time and space for everyone wishing to view the posters to do so. Combining the poster session with a reception can work out well. Sometimes, authors describe what is in their poster in a short, say two minute, overview in between spoken presentations.

At the NZMS Colloquium we have used poster sessions. Competitors for the ANZIAM-sponsored prize would usually spend most of the session near their poster so that they can be judged on what they have to say about their work as well as the poster itself.

My own view is that a poster should be self-contained so that it is reasonably intelligible without the author's guidance. I like to have a chance to have an initial look at the poster before discussing it with the author. However, it can be helpful to have the author talk through the main points of the poster as a whole as well as answer any specific questions. The author at this stage can indicate what is the background and what is new research that they have conducted themselves. Different members of the audience will have different expectations and desires. The poster author needs to adapt to the individual discussions.

As with a talk, remember that the audience is there to see what you have done. Seeing your poster and discussing your work should be enjoyable for them and possibly teach them something new. Share your enthusiasm for your research.

CONCLUDING NOTE

Posters are a useful way to present research. As with any presentation, there is no single best way to construct a poster. I've been involved with writing and producing six different research posters over the last five years and remain enthusiastic about posters. However, they do take some preparation time so start early!

I'm hoping that the good show of posters at the NZMS Colloquium continues.

Winston L. Sweatman

STUDENT TRAVEL GRANT REPORTS

EUROPEAN CONFERENCE ON MATHEMATICAL & THEORETICAL BIOLOGY

Recipient: Wen Duan

Supervisor: Prof. James Sneyd

Institute: The University of Auckland

This is the first year of my postdoc. My major work is to extend my PhD research and continue to study GnRH neurons in mouse brains and build up a spatial model of these neurons.

GnRH neurons are hypothalamic neurons that secrete gonadotropin-releasing hormone (GnRH), which is one of the crucial hormones for sexual development, fertility and maturation. During my PhD study, our focus was trying to understand the mechanisms underlying the production and synchronization of calcium oscillations in GnRH neurons, how such oscillations are related to the membrane potential, and how they control secretion of GnRH. A mathematical model was successfully built up to explain the relationship between electrical bursting and calcium transients in GnRH neurons. Two papers were published based on this and one is in the Journal of Neuroscience, and another one is in the Journal of Theoretical Biology.

Although the previous study helped us to understand the electrical property more, we are still not clear about the GnRH secretion process. In other words, we are still not sure how GnRH neurons secret GnRH. In order to understand more about GnRH neurons, based on some recent experimental data, we now focus on the spatial activity of GnRH neurons. A spatial model of GnRH neurons is being constructed and the bifurcation analysis of this PDE model will be followed.

In the mean-time, we have made some progress about a double FHN system. With the knowledge of the original 1D GnRH neuron model, and the knowledge of the FHN system, we are able to use two FHN systems to produce GnRH neuron bursting activity. This has been written up and will be submitted soon. Other work that we are doing is related to applied currents to GnRH neurons but this work is still at early stage.

In July this year, I had the chance to attend the ECMTB (European Conference on Mathematical and Theoretical Biology) 2011, which was held in Krakow, Poland. Overall I found this conference very useful. I presented a poster over there and I got a lot of positive feedback. I also made a lot of friends in the theoretical biology area, because a lot of people (more than 1000) went there. Some of these people are not really experts in the area at this stage but I can tell some of them will succeed in the future. So I feel it is good to make friends with these people and get contacts with them. I also saw a lot of famous researchers and I had chances to talk to some of them. In fact, one of these people is calling for postdocs and I will seriously consider it.

One of the good things about this conference is that I listened to a lot of good talks. Although I had problems understanding every single talk that I went to, but I did come across some nice presentations. I was especially fascinated by talks given by Michael Reed and Hiroki Ueda, which have something to do with network control. I got some simple ideas about how those works are being done and learned a lot of physiology from these talks.

To sum up, I am very glad that I went to this ECMTB 2011. I met a lot of people there and I had a lot of time talking to them. I also made some contacts after I came back to New Zealand. This trip had been one of my best conference experience. I very much appreciate the NZMS financial assistance, the grant money has helped me a lot.

NEW ZEALAND ASSOCIATION OF MATHEMATICS TEACHERS CONFERENCE

Recipient: Simon Todd

Institute: University of Canterbury (Undergraduate)

Thanks to an NZMS Student Travel Grant, I had the pleasure of being able to attend the 12th biannual New Zealand Association of Mathematics Teachers conference at Otago Boys' High School.

Well... almost. For starters, though it was school holidays, I am a 3rd year university student, not a teacher, so wasn't on holiday myself and could only attend for one day. And in that one day, the timing of flights meant that I could only be in Dunedin for a few hours, a large amount of which was to be spent travelling between the airport and the city. So, thanks to an NZMS Student Travel Grant, I had the pleasure of being able to attend a few hours of the 12th biannual NZAMT conference.

Well... almost. Unfortunate weather conditions had caused the Dunedin runway to become covered in ice, delaying my arrival for over an hour, so that I was actually at the venue for only an hour and a half. And by the time I arrived, I was 10 minutes late for the one workshop I really wanted to attend — my own.

I was at NZAMT12 to host a workshop on Scholarship Calculus, as I have developed a text, $4t\varphi$, which I use for the Scholarship tutorials I take at St. Andrew's College and which I have published for use at other schools around the country. While there was significant motivation to promote this text during the workshop, the focus was more on encouraging discussion between teachers about what they currently do to extend students and prepare them for work at Scholarship level, and what they would like to do in an ideal world. Such discussion was intended to help teachers reflect on their activities, and also to help me develop my text before the next print run, so as to be of optimal usefulness.

Feedback and involvement in discussions indicated that the workshop was highly appreciated by the 25 teachers who attended, as was the presence of a text to support learning at the higher level required for Scholarship — the first of its kind. I also highly appreciated the input from teachers, and picked up many ideas which will be helpful as I come to reconsider the content and presentation of my text. I know look forward to bringing these ideas to fruition and helping schools around the country better extend and prepare the brightest mathematicians of their age.

More information regarding $4t\varphi$, as well as audio recordings of the discussion from the workshop, can be found on my website, www.scholcalc.co.nz.

NOTICES

CALL FOR NOMINATIONS FOR NEW ZEALAND MATHEMATICAL SOCIETY COUNCIL POSITIONS

Nominations are called for three Councillors on the New Zealand Mathematical Society Council.

The term of office of a Council member is three years. Council members may hold office for two (but no more than two) consecutive terms.

Nominations should be put forward by two proposers. The nominee and the two proposers should be current Ordinary or Honorary members of the New Zealand Mathematical Society. The nominations, including the nominee's consent, should be forwarded by Wednesday 30th of November to the New Zealand Mathematical Society Secretary.

If nominations are sent by email, the two proposers and the nominee should each send separate email messages to the Secretary.

Alex James

NOTICE OF THE ANNUAL GENERAL MEETING

The Annual General Meeting of the New Zealand Mathematical Society will be held on Tuesday 6th December 2011, during the New Zealand Mathematics Colloquium at University of Auckland, 5–8 December, 2011.

Items for the Agenda should be forwarded by Wednesday 30th of November to the New Zealand Mathematical Society Secretary.

Alex James

STUDENT SUPPORT TO ATTEND MISG 2012

The New Zealand Mathematical Society is offering grants towards the travel costs of students who attend the Mathematics and Statistics-in-Industry Study Group Workshop (MISG) at RMIT University, in Melbourne 5–10 February 2012. To be eligible students must be enrolled at a New Zealand University and are expected to be a member of the New Zealand Mathematical Society.

To apply for funding complete the usual NZMS financial application form marking the entry: Travel to MISG12. The deadline for applications is 1 December 2011.

Alex James

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)	.....

.....

.....

Estimated total expenditure: .....

Date of expenditure: .....

Other sources of assistance sought/approved (please specify below):

.....

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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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- 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 student over the course of their studies)

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- Please give your reasons for making this applications and the plans you have for spending the grant if your application is successful:

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- Please list any supporting documents or other evidence (attached to your application):

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- Supporting statement from Supervisor, Head of Department or person of responsibility.

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Please send this application (and any supporting documents or other evidence) 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 July and November each year, but applications may be considered at other times in exceptional circumstances.

New and Notable Titles from SIAM

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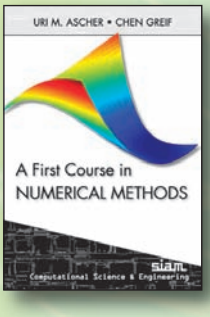
A First Course in Numerical Methods

Uri M. Ascher and Chen Greif

Computational Science and Engineering 7



This new book is designed for students and researchers who seek practical knowledge of modern techniques in scientific computing. Avoiding encyclopedic and heavily theoretical exposition, it provides an in-depth treatment of fundamental issues and methods, the reasons behind the success and failure of numerical software, and fresh and easy-to-follow approaches and techniques. The authors focus on current methods, issues, and software while providing a comprehensive theoretical foundation.

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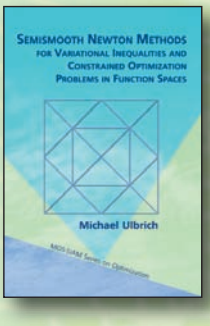
Semismooth Newton Methods for Variational Inequalities and Constrained Optimization Problems in Function Spaces

Michael Ulbrich

MOS-SIAM Series on Optimization 11



This book strikes a balance between thoroughly developed theory and numerical applications. Although largely self-contained, it also covers recent developments in the field, such as state-constrained problems, and offers new material on topics such as improved mesh independence results. The theory and methods are applied to a range of practically important problems, including optimal control of semilinear elliptic differential equations, obstacle problems, and flow control of instationary Navier–Stokes fluids.

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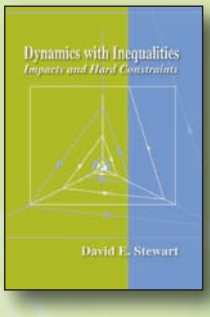
Dynamics with Inequalities: *Impacts and Hard Constraints*

David E. Stewart



This is the only book that comprehensively addresses dynamics with inequalities. The author develops the theory and application of dynamical systems that incorporate some kind of hard inequality constraint and demonstrates that hard limits—eschewed in most dynamical models—are natural models for many dynamic phenomena.

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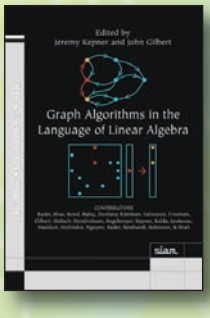
Graph Algorithms in the Language of Linear Algebra

Jeremy Kepner and John Gilbert, Editors

Software, Environments, and Tools 22



This book discusses the field of graph algorithms, one of the pillars of theoretical computer science, informing research in such diverse areas as combinatorial optimization, complexity theory, and topology. The authors show how to leverage existing parallel matrix computation techniques and the large amount of software infrastructure that exists for these computations to implement efficient and scalable parallel graph algorithms.

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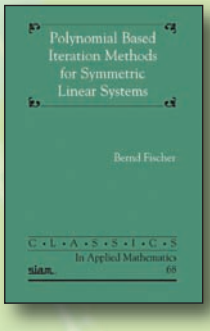
Polynomial Based Iteration Methods for Symmetric Linear Systems

Bernd Fischer

Classics in Applied Mathematics 68



This is the only textbook that treats iteration methods for symmetric linear systems from a polynomial point of view. This particular feature enables readers to understand the convergence behavior and subtle differences of the various schemes, which are useful tools for the design of powerful preconditioners. This book presents what appear to be the most efficient methods for symmetric linear systems of equations.

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Dr. Harald Kammerer, a Maple user for 20 years and Head of R&D, GERB, Germany

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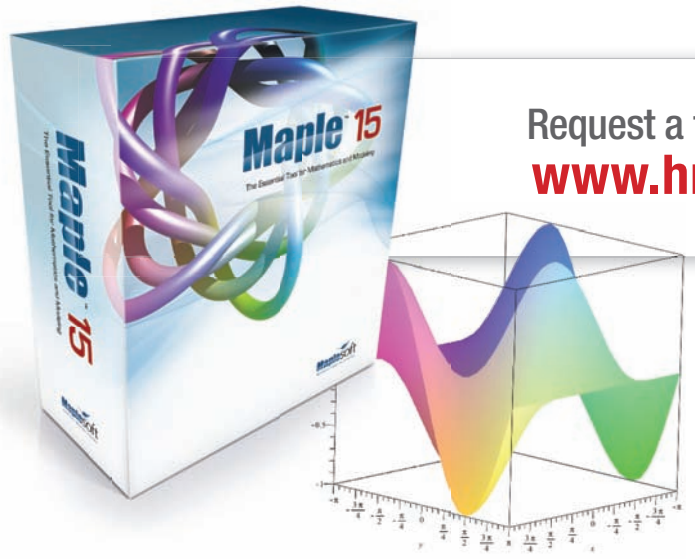

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