Number 106 August 2009


# 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 with Phil Wilson, compiled by Rachael Tappenden and Pauline Auger and printed at University of Canterbury. The official address of the Society is:

The New Zealand Mathematical Society,
c/- The Royal Society of New Zealand,
P.O. Box 598, Wellington, New Zealand.

However, correspondence should normally be sent to the Secretary:

Dr. Winston L. Sweatman
Institute of Information and Mathematical Sciences
Massey University at Albany
Private Bag 102904
North Shore 0745
Auckland
New Zealand
w.sweatman@massey.ac.nz

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### Web Sites

The homepage of the New Zealand Mathematical Society is:

http://www.math.waikato.ac.nz/NZMS/NZMS.html (Webmaster: stephenj@math.waikato.ac.nz)

The newsletter is available at: http://IFS.massey.ac.nz/mathnews/NZMSnews.shtml

Editorial enquiries and items for submission to this journal should be submitted as text or LaTeX files to nzmseditor@math.canterbury.ac.nz.

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# EDITORIAL

Kia ora koutou

It has been an excellent few months for our mathematical community. The newsletter is crammed full of news on post doctoral fellows and PhD students highlighting the vibrant nature of mathematics (and its assorted partners) in New Zealand.

A hearty congratulations goes to Mick Roberts for his recent, well-deserved accolade. As for other mathematicians in the news those who saw Mike Steel on breakfast television recently will have been impressed with his deep understanding of the Kiwi friendship network (or maybe he's receiving sponsorship from an upcoming telecommunications company...). Maybe we can test his theories at the upcoming colloquium.

*Alex James*
*Editor*

# LOCAL NEWS

## AGRESEARCH

Tanya Soboleva and Nicole Roy (AgResearch Grasslands) have obtained a Riddet CoRE grant entitled "Modelling microbial biofilms in human bowels". This grant will support a new PhD student starting with our modelling group in August. Tanya and Prof. Neil Gemmel (UOtago) have also begun a project entitled "Mitochondrial mutations for universal biocontrol". Tanya also attended the Meeting of the International Society for the Systems Sciences in Brisbane in July.

Kumar Vetharaniam attended the New Zealand Society of Animal Production conference in Lincoln University in June. Kumar presented a talk entitled "Understanding the interaction of prolactin and leukaemia inhibitory factor signalling during the switch from lactation to involution".

*Paul Shorten*

## THE UNIVERSITY OF AUCKLAND

### DEPARTMENT OF COMPUTER SCIENCE

Note: service resumes from the Department, and your correspondent has decided to be selective (sometimes forced by lack of information supplied by colleagues!), and include items most likely to be of interest to NZMS members (the current issue contains a backlog which should be cleared by next issue). If readers have a strong desire to read about all the goings-on of the wider department, please let me know. The department contains at least 5 staff who can be considered as mathematical scientists for all practical purposes – see `http://www.cs.auckland.ac.nz/research/groups/theory/` for details – and a larger number for whom mathematics is something to be avoided when possible!

The Department's Peter Gibbons Memorial Lecture series was begun in May this year, following the sudden and shocking death of our longtime and much loved colleague Peter Gibbons in February 2008. The underlying theme for 2009 was the work on Peter Gibbons himself, and the inaugural lectures were delivered by Charles Colbourn, Myra Cohen, Alexei Drummond and John Hamer/Andrew Luxton-Reilly/Beryl Plimmer. Subsequent years will have different general themes and this public lecture series is intended to be the department's main outreach activities. Attendance was very good, and included many members of the campus community and even a persistent, occasionally humorous, heckler (presumably from off campus). See http://www.cs.auckland.ac.nz/research/GibbonsLectures/ for more details.

The NZIMA Programme in Algorithms, run by Charles Semple and Mike Atkinson and locally by Mark Wilson, held a public lecture in February by Prof Bernard Chazelle, Eugene Higgins Professor of Computer Science at Princeton University. This well-attended public talk was repeated in three other cities during the following week. The Programme also held a song competition which was won by University of Auckland student Danver Braganza. His winning effort (to the tune of Billy Joel's "It's still rock and roll to me") can be found at `http://algo.otago.ac.nz/algorithmics/fun/`.

(Medium-longterm) visitors: Timothy de Vries (University of Pennsylvania) visited Mark Wilson in June; Karl Svozil (Technische Universität Wien) and Michael Kohlhase (Jacobs University Bremen) visited Cris Calude recently.

John Hosking has two new postdocs: Karen Li and James Skene. Alex Raichev has completed his postdoc with Mark Wilson and is still in the building as an Honorary Research Fellow, while teaching across the road at AUT.

Mark Wilson and Andre Nies are on sabbatical leave for Semester 2 2009. The former will be several months based in California with trips further east; the latter will, if true to form, visit as many places as is humanly possible.

André Nies has received the great honour of an invitation to speak at the ICM 2010 in India. He and Gaven Martin will be only the second and third NZ-based mathematicians (after Rod Downey in 2006) to be so invited. André's recent book *Computability and Randomness* was published by Oxford University Press in January.

Alexei Drummond was promoted to Associate Professor in the last round, continuing his meteoric rise. Alexei received his PhD in 2002 and returned to the department in 2005 after a postdoctoral stint at Oxford University. He has been chosen to speak to graduands at the faculty graduation ceremony and also was an inaugural Gibbons lecturer. In the last couple of years, he also won the Hamilton Memorial Prize from the RSNZ and received a Marsden Fund grant. He has formalized a research group in computational evolution with colleagues in Mathematics and Statistics – see `http://compevol.auckland.ac.nz/people/`.

Mark Wilson and colleagues from Mathematics, Statistics and Economics have formalized a group studying mathematical/computational social choice, see `http://www.cs.auckland.ac.nz/ mcw/dmss/`.

Our department kept up its record at the National Tertiary Teaching Excellence Awards this year when Paul Denny followed John Hosking's award from last year.

Gill Dobbie has recently been promoted to Professor, apparently only the second female professor of Computer Science in NZ history.

## SELECTED SEMINARS

**Mike Stay** (Google US and the University of Auckland), "Physics, Topology, Logic and Computation: A Rosetta Stone"

**Charles Colbourn** (Arizona State University), "Perfect Hash Families in Polynomial Time"

**Charles Colbourn** (Arizona State University), "The Combinatorics at the Heart of the Problem"

**Myra Cohen** (University of Nebraska) "Making Software Testing Easier"

**Alexei Drummond** (University of Auckland) "Developing Darwin's Computer"

**John Hamer, Andrew Luxton-Reilly, Beryl Plimmer** (University of Auckland), "Technologies for Deep Learning"

**Alistair Moffat** (University of Melbourne), "Against Recall: Is It Persistence, Cardinality, Density, Coverage, or Totality?"

**Tim Bell** (University of Canterbury), "The New ICT Curriculum for Secondary Schools"

**Eric Roberts** (Stanford University), "Rediscovering the passion, beauty, joy, and awe: Making computing fun again"

*Mark Wilson*

## DEPARTMENT OF ENGINEERING SCIENCE

The last few months have been rather quiet in Engineering Science, may be a good thing after the hectic start of the year. We have two new staff, David Long and Keri Moyle joined the department on fixed term lecturer contracts funded by research grants. Another new arrival is Pieter Willcox Pretorius, Karen Willcox's baby boy, who arrived in time to make the 40th moon landing anniversary and Sir Ed's birthday. The former event may be of more significance, as his mother got down to the last 40 candidates for NASA's next set of astronauts.

Other news of interest from our staff are that Rosalind Archer gave a talk on "CO2 Sequestration - Band Aid Solution or a Silver Bullet?" in the Cafeé Scientifique series of the Auckland Museum Institute. The unusual venue for this was the The Horse and Trap pub.

Don Nields collaboration with Andrey Kuznetsov of North Carolina State University continues to flourish. In the number of jointly authored refereed journal papers they have now caught up with the British mathematicians G. H. Hardy and J. E. Littlewood. A search of the Web of Science database with "Hardy and Littlewood" turns up 51 papers published between 1913 and 1946. A similar search with "Nield and Kuznetsov" finds 46 papers dating from 1999, and they have a further 6 papers accepted for publication, and several others under review.

In the April newsletter I reported that Andy Philpott (with Graeme Everett, an Engineering Science graduate, and Kjetil Vatn) are finalists for their Paper Industry Value Optimization Tool. Unfortunately they did not win but returned with a finalist's award. Well done!

Other newsworthy items are listed below.

## PhD COMPLETIONS

Ziming Guan completed his PhD on "Strategic Inventory Models for International Dairy Commodity Markets". Supervised by Andy Philpot and supported by a Bright Futures Enterprise Scholarship sponsored by Fonterra, Ziming developed a suite of inventory models for maximizing expected earnings in international dairy commodity markets under uncertainty in milk supply. He also studied the strategic behaviour of other agents in the market using game-theoretic models.

Related to this, three students graduated in the autumn graduation with PhDs. The photo shows (from left) Ziming Guan, Matthias Ehrgott, Richard Lusby, Oliver Weide, and David Ryan. Matthias and David are Richard's and Oliver's supervisors.

University of Auckland - Autumn Graduation

## BOOKS

Don Nield edited the Special Issue on "Advances in Convection in Porous Media: The R. A. Wooding Legacy" of the journal Transport in Porous Media, vol.77, no.2, March 2009. Robin Wooding was the subject of the Centrefold of the December 2007 Issue of the NZMS Newsletter. NZ contributions to the SI were papers by Robert McKibbin, Graham Weir, Warwick Kissling and Don Nield.

Matthias Ehrgott is one of the editors of "Evolutionary Multi-Criterion Optimization 5th International Conference, EMO 2009, Nantes, France, April 7-10, 2009" published as volume 5467 in Springer's Lecture Notes in Computer Science. Ehrgott, M.; Fonseca, C.M.; Gandibleux, X.; Hao, J.-K.; Sevaux, M. (Eds.) 2009, XV, 586 p., Softcover, ISBN: 978-3-642-01019-4

This book constitutes the refereed proceedings of the 5th International Conference on Evolutionary Multi-Criterion Optimization, EMO 2009, held in Nantes, France in April 2009. The 39 revised full papers presented together with 5 invited talks were carefully reviewed and selected from 72 submissions. The papers are organized in topical sections on theoretical analysis, uncertainty and noise, algorithm development, performance analysis and comparison, applications, MCDM track, many objectives, alternative methods, as well as EMO and MCDA.

## SEMINARS

**Bart Verleye** (University of Auckland - Bart is a postdoc working with Piaras Kelly) "Computation of the Permeability of Textile Reinforcements"

**Klaus Regenauer-Lieb** (Western Australian Geothermal Centre of Excellence, Kensington, Australia) "Geothermal Energy: From the Perth basins to the Taupo Volcanic Zone"

**John O'Sullivan** (University of Auckland - John is a PhD candidate working with Rosalind Archer) "Modelling Wind Flow in Complex Terrain"

*Matthias Ehrgott*

## DEPARTMENT OF MATHEMATICS

Mavina Vamanamurthy came to his office on March 30, but he looked rather tired and he left after an hour. On April 6 Vaman died of leukemia, at the age of 74. The memorial service, held on March 8 at the Mahatma Gandhi Centre, was attended by about 700 people. Warm tributes to Vaman were given by his family and some friends, including John Butcher. An obituary article about Mavina Vamanamurthy is published elsewhere in this Newsletter.

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At the University of Auckland Staff Common Room on March 28 the Memorial Sevice for Keith Worsley was attended by his parents, sister and brother, plus about 100 other people. Graham Baird had taught Keith here, and he came from Tasmania for the service, and some people came from the South Island. The speakers celebrated Keith's life and mourned his death at the age of 57. Vaughan Jones sent a tribute to Keith which was read for him by their mutual friend Pete Brothers. Alan Lee (as Dean of Science) announced the establishment of a Keith Worsley Prize for undergraduate students of statistics. The memorial service at McGill University on March 17 had been attended by many of the world's leading statisticians and brain researchers. The University of Chicago Memorial Service was attended by Keith's brother David and by Keith's close friend Vaughan Jones, and by many eminent statisticians. An obituary of Keith Worsley is published elsewhere in this Newsletter.

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Jianbe An and Eamonn O'Brien received an FRDF grant of $150,000 for the project "From Chaos to Order: classification approaches to finite groups", to support a 2-year PostDoctoral Fellow who will take up his appointment in October.

Bill Barton has been promoted to the rank of Professor. He was invited to give three seminars in the Canary Islands in May, and he was a plenary speaker at this years MERGA conference at Wellington in July. He has been appointed to the

International Advisory Committee of the 50th anniversary conference of the InterAmerican Congress of Mathematics Education (IACME-XIII), and also to the Advisory Board of the Ireland National Centre for Excellence in Mathematics and Science Teaching and Learning.

David Bryant was an invited speaker at a workshop in Adana, Turkey, on "Cereal Diversity, Plant Domestication and Human history in the Fertile Crescent", which was attended by prominent agricultural geneticists and archeo-botanists. The workshop was followed by a field-trip in Kurdistan, including visits to ongoing archaeological excavations. David has been developing methods for inferring patterns of crop domestication from genetic data.

John Butcher visited Beijing in May, and he presented lectures at Tsinghua University and at the Chinese Academy of Sciences. Also he took part in the ninth SciCADE conference, which included a minisymposium on "B-series and Butcher Trees". At SciCADE John gave a lecture, and he presented the John Butcher prize for the best student talk at that conference to Ludwig Gauckler of Tu"bingen University. In June he presented talks at the Canadian Applied and Industrial Mathematics Society's conference in London, Ontario; and also at a conference on Scientific Computation in Geneva. That Geneva conference included a minisymposium on "Hopf algebras in numerical analysis of ODEs", in which John's work on Butcher Groups was prominently featured. In July he took part in the first PRIMA (Pacific Rim Mathematics Association) Congress in Sydney and the combined MODSIM/IMACS congress in Cairns, Queensland. He presented a talk at each of those meetings, and he took part in discussions as a member of the Board of Directors of IMACS.

Marston Conder gave an invited course of lectures for 2 weeks at a summer school for graduate students in China in May 2009, hosted by the new Beijing International Mathematical Research Center, at Peking University (as Eamonn O'Brien also did). He gave invited lectures at the following recent conferences: the opening lecture at the "Minisymposium on Discrete Mathematics" at the University of Ljubljana (June 2009), a plenary lecture at the "Conference on Graph Embeddings and Maps on Surfaces" in Slovakia (June 2009), an invited lecture in the Computational Algebra session of the "Pacific Rim Mathematical Congress" at Sydney (July 2009), and a 1-hour lecture at "Groups St Andrews - Bath" (August 2009). Marston has been invited to be the main speaker at a symposium at the ANU in Canberra to commemorate the 100th anniversary of the birth of Bernhard Neumann, on 15th October. He is chairing the TEC's PBRF Sector Reference Group, which is charged with making recommendations about the next PBRF round in 2012. The University of Auckland included a photo and brief profile about Marston Conder and his work, in a recent item in "New Scientist".

Sina Greenwood has recently attended 2 conferences: "Algebra and Analysis Around the Stone-Cech Compactification, a meeting in honour of the 75th birthday of Dona Srauss" at Cambridge on July 5 to 8, and the "24th Summer Conference on Topology and Its Applications" at Brno (Czech Republic) on July 4 to 17 Also she visited Chris Good in Oxford for 2 weeks around those two conferences.

Jari Kaipio gave a one week minicourse (with Ville Kolehmainen, University of Kuopio, Finland) in Joao Pessoa, Brazil on "Statistical Inverse Problems" in March. He also visited Universidade Federal de Rio de Janeiro for a week during this visit. In April he gave an invited talk in the Finnish-Korean symposium in inverse problems in Seoul. Later in April he gave a plenary talk in the International Workshop in Process Tomography, in Tokyo, Japan, where he also was invited to act as the honorary chairman. In June he gave a talk in the British-Nordic Conference of Mathematicians and in July in the Applied Inverse Problems conference in Vienna. In June and July he spent 5 weeks in the University of Kuopio, Finland, to collaborate with the local researchers.

Barbara Miller-Reilly presented a talk at the "Adult Learners of Mathematics" Conference in London, on July 7 to 10.

Eamonn O'Brien gave an invited course of lectures for 2 weeks at a summer school for graduate students in China in May 2009, hosted by the new Beijing International Mathematical Research Center, at Peking University (as Marston Conder also did). He was an invited speaker at the conferences on "Groups and Computation" at the University of Warwick (July 2009), the "ICMS workshop on Matrix Recognition" at Edinburgh (July 2009), and at "Groups St Andrews - Bath" he gave a series of 4 plenary lectures, in August 2009.

Maxine Pfannkuch was an invited speaker at the National Numeracy Conference in February, in Auckland.

Ivan Reilly spent a month at Hacettepe University (Ankara) in June and July, where he held a Fellowship for Visiting Scientists awarded by the Scientific and Technological Council of Turkey. While he was there, he was a plenary speaker at the "International Conference on Topology and its Applications", on July 6 to 11. That was a very productive visit scientifically - he got the first drafts

of two (absolutely new) papers written. Ivan and his Turkish co-author are now working on polishing them up for submission.

Phil Sharp visited the Jet Propulsion Laboratory (JPL) at Pasadena on July 13 to 17, to continue his collaboration with Dr Julie Castillo, Dr Dennis Matson and Dr Kevin Grazier on modelling the thermal evolution of the mid-sized icy satellites of Saturn (this work is being funded by a NASA grant). He gave a seminar at JPL entitled "N-body simulations of the Solar System: symplectic or non-symplectic?".

Arkadii Slinko has received an FRDF grant of $17400, for his project on "Sequential Decision Theory".

James Sneyd was a plenary speaker at the first international joint meeting of the Chinese Society for Mathematical Biology and the Society for Mathematical Biology at Hangzhou. And he gave an invited talk at the Annual Meeting of the American Thoracic Society, San Diego, USA.

Garry Tee was interviewed by Graeme Hill about the effect of Bletchley Park on World War 2, especially the work of Alan Turing. That interview was broadcast by the Radio Live network on April 26.

Tom ter Elst has visited the University of Bordeaux I, the University of Swansea and the University of Ulm (Germany). He gave colloquium talks at those universities, and also at Cardiff and at Augsburg. Also he gave talks at the "Wales Workshop on Mathematical Analysis and Modern Applications" (in Swansea), at the "International Conference on Nonlinear Parabolic Problems, in honor of H. Amann" (at Bedleo), and at the "Workshop on Spectral Theory and Harmonic Analysis" (in Canberra).

Mike Thomas was an invited speaker at the "National Numeracy Conference", held at Auckland in February, and he was a plenary speaker at the "International Conference of Embedding Technology in Mathematics Education" in March at Taichung, Taiwan. He was also one of 25 invited participants at the EARLI Colloqium in Bruges, Belgium on "Cognitive neuroscience meets mathematics education". He attended (with Sepidah Stewart and Mala Nataraj) the PME in Greece. He was an invited speaker at the Auckland Mathematical Association HOD day in June. Mike has been invited on to the Editorial Advisory Board for the International Journal of Mathematical Education in Science and Technology and he has also been invited to join the Advisory Board of the International Geogebra Institute. Shayne Waldron was an invited speaker at the "Tenth International Meeting on Approximation" held in beda (Spain), from June 27 to July 2. Shixiao Wang's paper "On the nonlinear stability of inviscid axisymmetric swirling flows in a pipe of finite length" was scheduled to get published in August, by Physics of Fluids. It solves a long-standing problem on instability in fluid flow, extending the classical Rayleigh criterion (in the linearized theory) to the nonlinear theory. Shixiao has been invited to give a talk at the "International Retreat on Vorticity Aerodynamics (IRVA)".

Recent visitors include: Dr Genevieve Brown (Northwestern University, Illinois), Prof. Tina Ming Hua Chan (National Taichung Institute of Technology, Taiwan), Dr Chih Chang (Taiwan), Dr Marta Civil (University of Arizona) Prof. Satya Deo (Harish-Chandra Research Institute, Allahabad), Dr Alice Devillers (UWA), Prof. Guillaurue Gagniard, Dr Adrian Hill (University of Bath), Dr Bill Holmes (Ohio University), Dr Mikhail Kochetov (Memorial University of Newfoundland), Dr Ville Kolehmainen (University of Kuopio, Finland), Dr Anssi Lehikoinen (University of Kuopio, Finland), Dr Tim Marshall (American University of Sharjah), Prof. Dragan Marusic (Ljubljana), Dr Joanne Mulligan (Macquarie University), Prof. Lawrence Peterson (University of North Dakota), Prof. Tomaz Pisanski (Ljubljana), A-Prof. Laurie Riggs (California Polytechnic - Pomona), Dr Alastair Rucklidge (University of Leeds), Prof. Zvi Rusak (Rensselaer Polytechnic Institute), Dr Aku Seppnen (University of Kuopio, Finland), Dr Azar Shakoori (University of Western Ontario), Prof. Ivan Shestakov (Sao Paulo), Dr Mary Silber (Northwestern University, Illinois), Dr Erik Van Vleck (University of Kansas), Prof. Wolfgang Willems (University of Magdeburg), and Dr Justin Wiser (Ohio State University).

Neils Bernhardt (supervisor Rod Gover) successfully defended his PhD thesis. Stevie Budden undertook his PhD oral exam by video link to London. Stevie's examiners were impressed by Stevie's development of algebraic properties of quandles, an algebraic group-like object which can be used to characterise knots. Eyal Loz (supervised by Jozef Siran and Marston Conder) completed his PhD, and has been offered a position with a finance company in Sydney.

Zhilong (Sam) Zhu has obtained a University of Auckland Doctoral Scholarship. Jessica Leigh has obtained an NSERC postdoc, and will be starting in the department (working with David Bryant) at the beginning of 2010. Emily Harvey won a "Red Sock" Award for best student poster at the Society for Industrial and Applied Mathematics conference on Applications of Dynamical Systems, held in Utah in May. This conference is the major international conference in Dynamical Systems and

competition for this award is stiff. A factor in Emily's success was the enthusiasm and professionalism with which she presented her poster.

Congratulations to Heather Macbeth, a former International Mathematics Olympiad bronze and silver medallist on the NZ Team and currently our Honours student. Next year she will be taking up a Trinity Studentship in Mathematics. It covers fees, flights and a living allowance, to complete the Cambridge "Tripos Part III" (Masters-equivalent) as a member of Trinity College. So Princeton University, where she has been admitted as a PhD student, will have wait for her one year.

The Student Research Conference 2009 was held on June 8. The speakers were: Heather Macbeth on Conformal and projective geometries of Einstein manifolds, Jan Hofmann on Automorphism groups of free groups: properties, presentations and image-restrictions, Inga Wang on Modelling contraction and calcium dynamics in airway smooth muscle in the lung, Matthew Randall on Aspects of projective differential geometry, Tuan Chien on The spectral theorem for bounded, unbounded Hermitian and normal operators, Noor Aishikin Adam on An ethnomathematical study of triaxial weave in Malay food cover weaving, Tatyana Gvozdeva on Roughly weighted games, Shafiq Rehman on Close approaches while performing accurate N-Body simulations, Annie Gorgey on Extrapolations of Runge-Kutta methods, Damien Burns on Constructive recognition of classical groups, Emily Harvey on Multiple timescales in models of intracellular calcium dynamics, Howard Cohl on Closed-form solutions for the fundamental solution of Laplaces equation in the hyperboloid model of hyperbolic geometry, Ilya Chevyrev on Maximum size of automorphism groups on compact Riemann surfaces of small genus, and Mike Smith on Vibration of elastic plates on a free surface.

This year's Incredible Science Festival was held on May 1. The Mathematics/Physics building was packed full of yelling children, all of whom were obviously having a wonderful time. Penrose Tiles were being shuffled all over the floor of Scispace, hundreds of children were doing the Braille Trail, and the Origami circus was packed.

This year's 46 Young Scholars studying university mathematics while still at high school have again done extremely well. These high achievers sat Maths 153, a version of Maths 150 and Engineering Science 111, in the first semester, with 87% gaining A passes, 54% gaining A+. They will now be eligible to study Stage 2 mathematics in their first full-time year at university.

At the end of the 4th century, the Greek mathematician Theon's daughter Hypatia of Alexandria became the first woman mathematician. Mike (Theon) Meylan has announced that Emmeline Hypatia Alexander-Meylan was born on July 9, and that Hypatia and her mother are both doing very well.

**SEMINARS**

**Heather Macbeth** "The de Giorgi regularity theorem (for elliptic PDE)", and "The Krull-Schmidt theorem for Abelian categories"

**Hannah Bartholomew** "Between two worlds: negotiating Maori identities in high-school mathematics"

**Ernie Kalnins** (University of Waikato) "Models of quantum quadratic algebras and their relation to classical superintegrable systems"

**John Butcher** "Numerical Mathematics and Mathematical Numerics"

**Erik van Vleck** (University of Kansas) "Exponential dichotomy, matrix decompositions, and Newton's Method"

**Andy Begg** (AUT) "Whats missing from mathematics?"

**Rod Gover** "Q-curvature, Q operators on forms, and detour complexes"

**Laurie Riggs** (California Polytechnic, Pomona) "Teachers Using Technology to Support Visualization and Differentiated Instruction"

**Elizabeth Winstanley** (University of Sheffield) "Furry black holes"

**Maire niRiordain** (University of Limerick) "Teaching and learning mathematics through Gaeilge"

**David Gauld** "Foliations of manifolds 2"

**Wolfgang Willems** (Universitt Magdeburg) "Characters and p-complements", and "The discrete logarithm problem. Elliptic curves or Edwards curves?"

**Sunanda Dixit** "A smoothing of the Long Line"

**Reyhaneh Reyhani** (Computer Science Department) "New measures of the difficulty of manipulation of voting rules"

**Sina Greenwood** "Abstract dynamics on topological structures"

**Jari Kaipio** "Optimization and optimal control in high-intensity ultrasound surgery"

**Yuri Vyatkin** "Introduction into conformally-invariant operators"

**Afshin Mardani** "Classification of $\omega$-bounded surfaces"

**Arkadii Slinko** "Simple games: what are the questions?"

**Tomaz Pisanski** (University of Ljubljana, Slovenia) "(Geometric) Configurations"

**Bryan Smith** (Industrial Research Limited) "The extended finite-element method and interface motion"

**Fiona Ell** "How does initial teacher education affect the development of teacher knowledge for teaching primary mathematics?"

**George Gheverghese Joseph** (University of Manchester) "A Passage to Infinity: the Kerala episode"

**Tatyana Gvozdeva** "Roughly-weighted simple games", and "A new bound for simple games"

**Satya Deo** (Harish-Chandra Research Institute, Allahabad) "On co-Hopficity of three-manifold groups"

**Noel J. Walkington** (Carnegie Mellon University) "Compactness properties of discrete solutions of parabolic equations"

**Nazli Uresin** "On abstract dynamical systems"

**Shixiao Wang** "Swirling flow transient waves and nonlinear stability"

**Barbara Miller-Reilly** "Mathematics is a hyena, it scavenges my self-confidence: utilizing metaphors in research"

**Irene Peng** (Indiana University in Bloomington) "An introduction to geometric group theory"

**Chris King** "Universal chaos from Eureka to zeta"

**Amanda Elvin** "Multiscale modelling of the lung"

**Heather Macbeth & Yuri Vyatkin** "Macbeth Dissertation talk (= Hilbert's Nullstellensatz) + Yuri on submanifolds", and "Fundamental equations of the geometry of submanifolds"

**Mikhail Kochetov** (Memorial University of Newfoundland) "Group gradings on finite-dimensional simple Lie algebras"

**Mike Thomas** "The role of gestures in learning mathematics"

**Jan Hofmann** "The automorphism group of the free group"

**Timothy DeVries** (University of Pennsylvania) "From enumeration to saddle-point analysis"

**Matthew Randall** "Aspects of projective geometry"

**Eyal Loz** "Graphs of given degree and diameter"

**Matthew Ryan** (Department of Economics) "Mixture sets - an introduction"

**Chris Tuffley** (Massey University) "The three reflections theorem"

**Genevieve Brown** (Northwestern University) "Time-delayed feedback control of subcritical limit cycles"

**Manfred Sauter** "A Faber-Krahn inequality for the Robin Laplacian"

**Diane Maclagan** (Warwick University) "Tropical Geometry"

**Bill Holmes** "A 3D computational model of the mammalian cochlea"

**Hamish Spencer** (University of Otago) "False models as means to truer Theorie"

**Zvi Rusak** (RPI) "A theory of the leading-edge stall of airfoils"

*Garry Tee*

## AUCKLAND UNIVERSITY OF TECHNOLOGY

### SCHOOL OF COMPUTING AND MATHEMATICAL SCIENCES

Recently, a Senior Lecturer position in Analytics within the School of Computing and Mathematical Sciences was advertised. An ideal appointee will be someone with a doctorate, the ability to teach and supervise students at graduate level, with established research expertise in some of the following areas of analytics: applied statistics, statistical computing, datamining, forecasting, multivariate analysis, regression analysis, sample surveys, operations research and coupled with an interest in applying such techniques to business and industry.

Jiling Cao was granted a Research and Study Leave in Semeter 2 2009. He will visit Zbigniew Pitrowski in Lubiatowo, Heikki Junnila at the University of Helsinki, and Valentin Gutev at KwaZulu-Natal University to continue their collaborated research on Mathematical Analysis and Topology. He also plans to visit a couple of universities in China. Jiling is a member of the Scientific Committee and

organizes the special session, "Topology and Abstract Analysis", for the International Conference of Mathematical Sciences to be held at Maltepe University, Istanbul, Turkey, from 04 to 10 August 2009.

Jeff Hunter recently visited Shanghai to firm up preparations for the International Workshop in Matrices and Statistics (IWMS 2010) to be held in Shanghai, June 5 to 8, 2010. Jeff is the Chair of the International Organising Committee (IOC) for this meeting and he was able to meet with members of the Local Organising Committee, some Chinese members of the Scientific Committee as well as giving seminars at Shanghai Finance University, the venue of the Workshop, and Shanghai Normal University. He also visited Shanghai Institute of Technology to meet with academic staff in the School of Chemical Engineering who assist in the co-managed programme with AUT in Applied Chemistry. We assist with the offering of a Quantitative Statistics for Research course in this programme.

Jeff also visited, over the period June 16 to 20, through the Hausdorff Centre for Mathematics, Professor Jochen Werner at the University of Bonn, Germany and spoke on "Generalized Inverses in Stochastic Modelling". He also attended, as a member of the IOC, and spoke on "The stochastic properties of semi-magic and magic Markov chains" at IWMS 2009 held June 23-27 at Smolenice Castle, Slovakia.

In June Sergiy Klymchuk with co-author John Mason, UK had their book "Using Counter-Examples in Calculus" published by Imperial College Press, UK. In July Sergiy Klymchuk gave two talks at two conferences: 33rd International Conference on Psychology in Mathematics Education in Greece and 14th International Conference on Teaching of Mathematical Modelling and Applications in Germany.

Alla Shymanska participated in the eighth European Conference on Numerical Mathematics and Advanced Applications, ENUMATH 2009, at Uppsala University, Sweden, from June 29 to July 3, 2009, and the 4th IMACS Conference on Mathematical Modelling and Computational Methods in Applied Sciences and Engineering, in Roznov pod Radhostem, Czech Republic, from June 22 to 26, 2009. She presented two talks at these conferences.

Stuart Young passed his PhD oral examination on 12 June 2009. He was recommended by his three examiners to be awarded a PhD (just subject to some minor amendments), and was complimented on the high standard of his thesis.

In July Felipe Lillo presented the talk "Partial Order Approach to Compute Shortest Paths in Multimodal Networks", based on joint research with his supervisor Andrew Ensor, at the EURO Conference on Operations Research in Bonn, Germany.

### SEMINARS

**Jeff Hunter** (Auckland University of Technology), "Applied probability in statistical consulting"

**Sergiy Klymchuk** (Auckland University of Technology), "My current projects in Mathematics Education"

**Alla Shymanska** (Auckland University of Technology), "Mathematical and computer simulations of stochastic processes of electron multiplication"

**Felipe Lillo Viedma** (Auckland University of Technology), "Partial order approach to compute shortest paths in multimodal networks"

*Jiling Cao*

## AUSTRALIAN AND NEW ZEALAND INDUSTRIAL AND APPLIED MATHEMATICS

## NEW ZEALAND ANZIAM BRANCH

At the AGM in December last year Shaun Hendy was elected as the chair, Alona Ben-Tal was elected as the secretary/treasurer, and Boris Baeumer, Richard Brown, Alex James , Carlo Laing, Claire Postlethwaite and Tanya Soboleva were elected as members of the executive committee.

The NZ branch of ANZIAM manages the John Butcher Prize in Numerical Analysis which has been established to recognize John Butcher's long and productive career in numerical analysis, and in particular in the numerical solution of ordinary differential equations. The prize is awarded for the best student talk at a SciCADE biennial meeting, considering both the academic merit of the content and the presentation itself. This year the prize was awarded at the SciCADE meeting in Beijing, 25-29 May 2009, to Mr. Ludwig Gauckler from Germany. He received the equivalent of $700. John Butcher presented the prize to Mr Gauckler on behalf of ANZIAM.

The ANZIAM NZ branch is a proud sponsor of the New Zealand Mathematics and Statistics Post-Graduate Conference 2009 and of the ANZIAM speaker at the Math Colloquium.

As of this year members can pay their membership fees at the same time they pay their NZMS fees. We thank John Shanks for his effort in this regard.

More information on ANZIAM and the New Zealand branch can be found in `http://www.anziam.org.au`.

*Alona Ben-Tal*

## UNIVERSITY OF CANTERBURY

### DEPARTMENT OF MATHEMATICS AND STATISTICS

July marked a change at the top of our Department, with HoD David Wall stepping down after 6 years to concentrate on teaching and research. A function was held to acknowledge David's contribution to the Department before he departed on Erskine leave to Scandinavia, where he has been basking in the midnight sun and, no doubt, enjoying his newfound freedom! Acting HoD John Hannah ensured the smooth running of the Department until our new HoD, Jennifer Brown, returned from overseas to take up the reins in late July. Jennifer will be assisted by Rua Murray, who has taken over the Deputy HoD role.

Another noteworthy event was the retirement function for Bob Broughton, acknowledging his 42 years of service to the Department. Although officially retired and now an Adjunct Senior Fellow, Bob will continue to teach until the end of the year.

In July, Miguel Moyers Gonzalez arrived from the University of Durham, UK, to take up a lecturing position. New Postdoctoral Fellows Abdulla Firag, Jeroen Schillewaert and Igor Rychkov also arrived to join existing Postdocs Richard Brown, Kathy Clark, Chris Dowden and Leo van Iersel.

Another arrival that cannot go unmentioned is that of Tessa Degnan, who was born in May - the first child of new lecturer James Degnan and his wife Vanessa, who arrived here earlier this year from the USA!

Another cause for celebration was the marriage in April of our Computer Technician Paul Brouwers and his partner Angela Knibb at her family's picturesque rural property.

Paul and Angela on their wedding day.

Congratulations to Ash Lightfoot who departed at the end of July on completion of his MSc to commence PhD studies in mathematics at Indiana State University, courtesy of a Fulbright Graduate Award. We also congratulate the following successful postgraduates - Mareike Fischer, Kyoko Fukuda and Jean Gong (PhD), Jason Bentley (MSc with First Class Hons), Josh Collins (MSc with First Class Hons), Matt Hendtlass (MSc with Distinction), and Michael Snook (MSc with Distinction).

The Hon. Gerry Brownlee presenting Ash Lightfoot with his Fulbright - Ministry of Research Science and Technology Graduate Award recently at Parliament.

As for academic visitors, we currently have 2 Erskine Fellows visiting the department, namely Professor John Rhodes (University of Alaska) and Professor Huaxiong Huang (York University, Canada). Other recent Departmental visitors include Professor Tae-Young Yang (Myong Ji University, South

Korea), Professor Elizabeth Allman (University of Alaska), Professor James Oxley (Louisiana State University), Professor Geoffrey Whittle (Victoria University Wellington), and former student Tim Candy (now studying for his PhD at Edinburgh University).

Academics travelling offshore have included Mike Steel, who has recently returned from a 4-week tour of Europe giving talks in Berlin, Budapest, Jena, Zurich, Bielefeld and Stockholm, and visiting Daniel Huson in Tübingen. Douglas Bridges is currently in Europe based at the Mathematisches Institut of the University of Munich from mid-June to early September as part of a research programme funded by MoRST and an IRSES Marie Curie grant awarded to a consortium of universities in Europe, Japan and Canterbury. Jennifer Brown recently spent 6 weeks working at the University of Wyoming, surrounded by stetsons, cowboy boots and spurs; and, earlier this year, Ben Martin visited the Isaac Newton Institute in Cambridge, giving talks at Royal Holloway and the University of Kent whilst over there.

Meanwhile, back at the coalface, Raazesh Sainudiin has been making use of the Numb3rs TV show to entertain and inform his students. Every Friday, an enthusiastic group gathers to watch the show and discuss the mathematics & statistics behind it with guidance from the local-mirror of Numb3rsCornell. `http://www.math.cornell.edu/~numb3rs/`.

Clemency Montelle continues to provide us with stimulating seminar programmes. See below for recent offerings.

### SEMINARS

**Bill Barton** (University of Auckland) "Language Issues in Undergraduate Mathematics in New Zealand"

**Raazesh Sainudiin** (University of Canterbury) "Auto-validating Trans-dimensional Rejection Sampler"

**Tim David** (University of Canterbury) "Challen ges in Modelling the Brain's Autoregulation System"

**Jasbir Chahal** (Brigham Young University, USA) "Why is the Riemann Hypothesis the Most Important Problem in Mathematics?"

**Wolfgang zu Castell-Rudenhausen** (Helmholtz Centre, Munich) "Concreting Abstraction: how Gelfand helped on computer tomography"

**Daniel Ueltschi** (University of Warwick, UK) "Random Permutations with Non-uniform Distribution"

**Andrew Simpkin** (National University of Ireland) "An Additive Penalty Approach to Derivative Estimation"

**Barbara Holland** (Massey University) "What's 'best practice' in phylogenetics?"

**Thomas Forster** (University of Canterbury/University of East Anglia) " An Introduction to Quine's Set Theory"

**Stephen Marsland** (Massey University, Palmerston North) "Does My Brain Look Big in This?"

**Elizabeth Allman** (University of Alaska Fairbanks) "Applications of Kruskal's theorem to the Identifiability of Statistical Models with Latent Variables"

*Pauline Auger*

## MASSEY UNIVERSITY

### INSTITUTE OF FUNDAMENTAL SCIENCES (MANAWATU)

Chris Tuffley has recently returned from the International Mathematical Olympiad in Bremen, Germany. Chris was accompanying the NZ team as an "Observer A", shadowing team leader Michael Albert (University of Otago); the expectation is that Chris will be leader or deputy next year in Kazakhstan, and then leader the year after in the Netherlands. This year was the 50th anniversary of the IMO, and for the first time over 100 countries participated. New Zealand placed 66th out of 104, and received one bronze medal (Malcolm Granville, Auckland Grammar School) and three honourable mentions. Some pictures and stories from the IMO can be found on the NZ Maths Olympiad Committee website, `www.mathsolympiad.org.nz`.

Barbara Holland will be visiting the University of Tasmania for five weeks, to work with Peter Jarvis and Jeremy Sumner (School of Mathematics and Physics) on the algebra of phylogenetic models in split networks. She will also discuss some interesting hybridisation data sets in eucalypts with Dorothy Steane (School of Plant Science).

Several of our PhD students have recently completed their degrees: Klaus Schliep and Liat Shavit-Greivink (both of the Allan Wilson Centre) have successfully defended their theses, and Dion O'Neale has submitted his. Liat is leaving to take up an

Alexander von Humboldt postdoc in Düsseldorf, and Dion is now at La Trobe for a postdoc with Reinout Quispel.

We welcome Fleur McDonald as a new PhD student. Fleur recently completed her honours degree with us, and has begun her PhD under Robert McLachlan. We also welcome nine visiting students from Greifswald, who are here on exchange and taking various mathematics courses.

Sanjith Gopalakrishnan, a high school student from India, spent six weeks here visiting Charles Little. Together they proved a new characterisation of planar graphs, in terms of the bonds of a graph. By Charles's count their result is at least the seventeenth characterisation of planar graphs! Sanjith is about to begin his undergraduate study at the Indian Institute of Technology.

### SEMINARS

**Mark Johnston** (Victoria University of Wellington), "Insight from visualisation in combinatorial optimisation"

**Robert McLachlan** "The algebraic view of mechanics"

**Charles Little** "A new characterisation of planar graphs"

### THESES

**Klaus Schliep** *Some applications of statistical phylogenetics.*

**Liat Shavit-Greivink** *Lineage specific evolution and phylogenetic analysis.*

**Dion O'Neale** *Preservation of phase-space structure in symplectic integration.*

*Christopher Tuffley*

## INSTITUTE OF INFORMATION AND MATHEMATICAL SCIENCES (ALBANY)

### MATHEMATICS NEWS

Joanne Mann has begun a two-year postdoctoral position working with Mick Roberts at Albany. Jo has recently passed her PhD oral exam, subject to minor amendments.

Yow-Tzong Yeh (Mathematics) and Chris Scogings (Computer Science) received the IIMS teaching awards for 2009. The awards were presented at a morning tea held to celebrate the occasion.

Alona Ben-Tal attended the SIAM Conference on Applications of Dynamical Systems, May 17-21, Snowbird, USA.

Shaun Cooper gave an invited lecture at the Ramanujan, Mathematics and Information Technology conference in Bangalore, India, in June.

Carlo Laing visited the UK in late March. He gave presentations at the 2nd Annual meeting of the UK Mathematical Neuroscience Network in Edinburgh and "Noise in Life" in Cambridge, and seminars at Heriot-Watt, Warwick and Nottingham Universities. He also attended the SIAM Conference on Applications of Dynamical Systems in Snowbird, Utah, in May, and then spent a week in Princeton working with Yannis Kevrekidis. Carlo is on sabbatical until January 2010 at the University of Nottingham, working with Prof Steve Coombes.

Gaven Martin was an invited speaker at the Harmonic Analysis, Geometric Measure Theory and Quasiconformal Mappings conference in Bellaterra, Barcelona, Spain. This visit was partially funded by the European Science Foundation. He was also an invited speaker at the AMSI-ANU Workshop on Spectral Theory and Harmonic Analysis Canberra, partially funded by the CMA at ANU.

Robert McKibbin attended two conferences during June. He reports: "I took part in MMC09/EA-SIAM5 (the 2nd International Conference on Mathematical Modelling and Computation 2009 together with the 5th East Asia SIAM Conference) held in Brunei, as an Invited Speaker, and gave a talk titled Mathematical modelling of heat and mass transport processes in geothermal systems. The meeting was held at Universiti Brunei Darussalam (UBD). Energy is a priority area in the UBD Faculty of Science and, although geothermal energy is not an obvious source in Brunei, it had been suggested that I provide an overview of the mathematical techniques used in modelling geothermal systems in general. It was good to meet up once more with Professor Roger Hosking, whom I knew from earlier days when he was at the University of Waikato and in Australia. I was also glad to meet again two UBD faculty members who had been students (1 PhD, 1 MSc) at Massey University during the 1990's. One, Dr Hjh Norhayati Hamzah, was a member of the Organising Committee, while the other, Dr Sannay Mohamed, was also an Invited Speaker, whose session I was pleased to chair.

"After the conference, I joined a field trip to a UBD field station in the rain forest. We reached the Kuala Belalong Field Studies Centre (KBFSC) by a combination of launch to Pekan Bangar, then bus to Batang Duri, followed by the highlight of the

travel, longboat to the KBFSC, about 1.5 hours upstream. The river was low, so a combination was required of fast approach, high-revving outboard, poling and, in several places, pushing the boat, up shallow rapids. The trip back (downstream) the following day took about 20 minutes. We stayed overnight in bunkrooms; it was hot and humid. A trip, via longboat a little way down the river and a 400-m climb up a walkway (mostly timbered to protect the forest floor), to a tree canopy walkway built of scaffolding and suspension bridges was dramatic. Views from the top, about 40 m above the ground, were extensive. The next day, the travel pattern was reversed, back to Bandar Seri Bagawan, the capital of Brunei.

"Secondly, I took part in the the 5th International Conference on Dynamical Systems and Applications, held at Ovidius University in Constanta, Romania, and presented a paper titled Modelling groundwater pollutant transport: transforming PDEs to a dynamical system. There were a number of papers on various aspects of flow in porous media, but many were theoretical studies rather than applications-based. Constanta, the second largest city in Romania and the biggest port on the Black Sea, is among the most-developed cities in the country. It started in 657 BC, when it was the Greek-controlled town of Tomis. I was able to make a short exploration of the old city (Tomis) and visited the Archeological Museum which covers history of the local area. The weather was warm, and breakfast each morning in the cool of my hotel's courtyard was a pleasure. To and from Romania, I overnighted in Istanbul, which is as busy and as fascinating as ever."

Mick Roberts visited Utrecht University in the Netherlands from 23 March to 26 June to carry out research with long-term collaborator Hans Heesterbeek. The main activities were a definitive (hopefully) account of next generation matrices, also with Odo Diekmann; development of a model with superinfection (the epidemic supermodel); and a model for estimating the case fatality ratio for swine flu, also with Hiroshi Nishiura and Don Klinkenberg. This last exercise hit the airwaves on his return, with interviews on Radio New Zealand and TV3. While away Mick gave seminars at Utrecht University and Imperial College London.

Graeme Wake visited Universiti Teknologie Malaysia in Johor Bahru in early June as a visiting professor and speaker at an international conference there. A collaborative agreement is being established with UTM to foster joint development in Industrial Mathematics. During this visit he also led a workshop on Industrial Mathematics. Graeme then went on to the University of Oxford to take up his short-term appointment as Visiting Fellow at the newly established Oxford Centre for Collaborative Applied Mathematics (OCCAM). He was a speaker at the OCCAM launch at the end of June, as was Professor Peter Hunter from the University of Auckland. While in England he spoke also at the Universities of Southampton and Leeds and then at the National University of Singapore on the way back to NZ at the end of July.

## STATISTICS NEWS

Marti Anderson is currently in the US for 3 months, working with the National Oceanic and Atmospheric Administration (NOAA) in Seattle, Washington and Corvallis, Oregon, helping them to model juvenile coho salmon in Oregon coastal streams in response to habitat characteristics. She is also doing work with colleagues on modelling beta diversity. In June she attended the meeting of the Western North American Region of the International Biometric Society held at Portland State University in Oregon and gave a talk titled Statistical Methods for Genome Conformation Capture Data. She then spent a week with collaborator Anthony Fiumera at Binghamton University in Binghamton, New York, looking at data from Drosophila (fruit flies) designed to test for association between male genotypes and increased reproductive success in wild flies. Finally, she attended a one day symposium in honour of her PhD advisor, Elizabeth Thompson, where she gave a talk titled Parentage Analysis for Nest Structured Data. The symposium was in honour of Elizabeth's 60th birthday, and her election (last year) to the U.S. National Academy of Sciences.

We have been pleased to welcome Howard Edwards back. He spent the first half of 2009 at the Northern Rivers University Department of Rural Health in Lismore, New South Wales, where he worked as consulting biostatistician on a range of research projects relating to population health and environmental epidemiology.

## SEMINARS:

The monthly series of short and informal mathematics talks organised by Alona Ben-Tal has been well attended by staff and graduate students. So far, Alona, Shaun Cooper, Graeme Wake, Carlo Laing, Gaven Martin and Mick Roberts have all spoken about their work. The talks by the postdoctoral fellows and remaining staff members are eagerly anticipated.

The statisticians have also been enjoying short informal talks. These have been organized by Beat-

rix Jones who has successful encouraged the PhD students (and some staff!) to talk about their work.

### OTHER SEMINARS:

**Marti Anderson** "Turning environmental models around: biological data can be used to predict the physical health of ecosystems"

**Paul Cowpertwait** "Stochastic point process models"

**Shaun Hendy** (MacDiarmid Institute for Advanced Materials and Nanotechnology, Victoria University of Wellington/Industrial Research Ltd) "Capillary absorption of metal nanodroplets by carbon nanotubes"

**David Herron** (University of Cincinnati, USA) "BiLipschitz Homogoneity, Bounded Turning and Inner Distance"

**Mark Morrison** (NIWA) "Linking juvenile fish nurseries in estuaries to coastal adult populations: why environmental degradation matters to fisheries management"

**Allen Rodrigo** (University of Auckland) "Recent developments in statistical phylogenetics"

**Graeme Wake** "Industrial Mathematics Initiatives"

*Shaun Cooper and Marie Fitch*

## UNIVERSITY OF OTAGO

### DEPARTMENT OF MATHEMATICS AND STATISTICS

The Department reluctantly farewelled Prof Derek Holton in April after twenty-three years of outstanding service to the Department, the University and the local and NZ mathematics communities. During Derek's career he was awarded the Paul Erds Award for significant contribution to the enrichment of mathematics learning within New Zealand, the CMSA medal for lifetime contribution to combinatorics, Fellowships of the Royal Society of NZ, the NZMS and the Institute of Combinatorics and Its Applications. Colleagues from around the University were invited to an afternoon tea in his honour and a Departmental dinner was held. Our best wishes go with Derek and his wife, Marilyn, who have moved back to Melbourne where he seems to be busier than ever in his retirement!

Claire Cameron's fixed term appointment as Teaching Fellow ended in June after 11 years. Staff changes following the first PBRF round led to rearrangement of Teaching Fellow positions. Claire has had a long association with the Department, having studied for her undergraduate and masters degrees here. Claire has recently submitted her PhD so we wish her well for success in the future.

Congratulations to Peter Dillingham who has just been awarded his PhD. The thesis title is "Population modeling of albatrosses and petrels with minimal demographic information". No doubt Peter and David Fletcher (supervisor) have had a dram or two to celebrate!

Two new fixed term Postdoctoral Fellow positions have been filled. Jamie Sanderlin from Wildlife Ecology and Management, School of Forestry and Natural Resources, and the Department of Statistics, University of Georgia, USA has taken up a Postdoctoral Fellow position working with Richard Barker on models for PCR and SNP data for genomic applications. Robert Thompson from the Multidisciplinary Centre for Astrophysics (CENTRA) with the Physics Department at the Instituto Superior Tcnico in Lisbon, Portugal is working with Jrg Frauendiener on general relativity and numerical methods.

Congratulations to Chris and Shana Fonnesbeck who welcomed baby Zachary Thomas Fonnesbeck on Saturday April 25 weighing in at a hefty 8lb 7oz (3.85kg).

Richard Barker travelled to Knoxville Tennesse to take part in a NIMBioS (National Institute for Mathematical and Biological Synthesis) workshop. The workshop team of biologists, statisticians, and mathematicians are working together to develop mathematical and statistical models for binary data that is commonly used in diverse applications such as studying food webs and pollinator networks or investigating how ecological communities are assembled. While in the neighbourhood Richard took the opportunity to catch up with former PhD student Matt Schofield now employed on a post-doc at Columbia and co-author Bill Link of the Patuxent Wildlife Research Center. Bill and Raichard's book 'Bayesian Inference with ecological applications' is hot off the press.

John Clark visited Kevin O'Meara in Brisbane to work on a linear algebra project.

Peter Fenton gave a talk on Wiman-Valiron theory in the unit disc at the sixth Computational Methods and Function Theory conference in Ankara, Turkey, 8-12 June, and later visited his one-time supervisor, W.K. Hayman, at his home at Bisley, Stroud, in the UK.

David Fletcher visited the Ecology Centre in Brisbane in January this year, and gave a seminar

on "Assessing Population Trends". He also took time out to visit Malcolm Faddy (Adjunct Professor at QUT) at his home in Melany, a very pleasant town near the Sunshine Coast: one of the highlights of the visit being the leech-bites he experienced when walking in the local rain forest.

John Harraway attended Helen MacGillivray's Forum "Building Networks in Statistics Education" in Brisbane in February for the NZSA. He took the opportunity to review recent ICOTS8 developments. When returning he spent a day in Auckland discussing CensusAtSchool. The set of productions for the second DVD on Case Studies involving the use of statistics in research is progressing with the help of the Campbell Fund Grant and it is hoped to have ten presentations ready for distribution to schools by the middle of this year.

Laimonis Kavalieris attended the Economics, Time Series Analysis and Systems Theory, the XIII International Conference on Applied Stochastic Models and Data Analysis and the 20th Annual Conference of The International Environmetrics Society in Vienna, Vilnius and Bologna from 8 June - 12 July. He also took the opportunity to visit his native Lithuania between conferences.

Three new overseas students have arrived to begin their PhDs. Fabien Montiel from France and Phil Weir from Ireland are studying applied mathematics with Vernon Squire and Tomas Bird from Canada studying statistics with Richard Barker and Chris Fonnesbeck.

**Seminars**

**John Eggleston** (Department of Mathematics, University of Queensland), "Design of Experiments for Bivariate Binary Responses "

**Elizabeth Winstanly** (Astro Particle Theory & Cosmosology Group, University of Sheffield), "Furry Black Holes"

**Laimonis Kavalieris** , "Probabilistic modeling of runoff in a semi-arid banded vegetation system"

**Boris Baeumer** "Stables on Tilt: the Road to Recovery"

**Aaron MacNeill** (Australian Institute of Marine Science), "The Trouble with Normal: Ecological Diagnostics of the Great Barrier Reef " item[Gareth Vaughan], "Waves under Arctic Sea-Ice"

**Woei Chet Lim** (Max Planck Institute for Gravitational Physics), "Spikey Mixmaster Dynamics near Singularities"

**Florian Beyer** (University Pierre Marie Curie, Paris), "Classes of Singular Problems in General Relativity: Analysis and Numerics"

**Denis Pollney** (Max Planck Institute for Gravitational Physics), "Modelling Black Hole Spacetimes"

**Mark Hannam** (University College, Cork), "Numerical Relativity and the Future of GW Astronomy"

**Peter Green** , "Replicating the Hockey Stick in a Toy Model"

**Gerrard Liddell** , "Proofs for Swirling Sweepers"

**John Haywood** (School of Mathematics, Statistics and Operational Research), "Memoryless Reigns of the 'Sons of Heavens': exponential rule lengths revealed and explained"

**Beata Faller** (Department of Mathematics & Statistics, University of Canterbury), "Combinatorial Challenges in Conservation Biology"

**Christopher Fonnesbeck** , "PyMC 2.0: Building Bayesian Statistical Models using Python"

**Jasbir Chahel** (Department of Mathematics, Brigham Young University, USA), "Why is the Riemann Hypothesis the Most Important Problem in Mathematics?"

**StatChat, Christopher Fonnesbeck** , "Rejecting Statistical Hypothesis Testing"

**Peter Dillingham** , "Adjusting Age at First Breeding of Gibson's Albatrosses for Emigration and Study Duration Using Bayesian State-Space CMR Models"

**Hyuck Chung** (Department of Physics), "Vibration of Lightweight Composite Structures with Random Irregularities"

**Austina Clark** , "Estimating Species Richness and Comparing Species Similarity using Various Models"

**Ralf Peter** , "Discrete Action Functionals and Symplectic Integrators"

**Phil Dixon** (Department of Statistics, Iowa State University, USA), "Modelling seed longevity to predict when to regenerate a germplasm connection"

**Jason Harris** (Wolfram Research), "The new era of Mathematica technology"

*Lenette Grant*

*Continues after centerfold . . .*

# Bob Broughton

Bob with his daughter Fleur and grandson Christian in Dominica.

Robert (Bob) Broughton came to the University of Canterbury in November 1967 (by ship) from the University College of North Wales (Bangor), having been appointed as the ninth member of staff of this Department. There were still seven vacancies when he arrived so he was immediately put to work on five full courses at 1st, 2nd, 3rd and honours level. This was like being thrown in the deep end for a 24 year old straight from university. As a computational mathematician with a background in Algol on an Elliot 803 computer, he took on the role of IT co-ordinator and systems analyst, and, eventually, IT Manager. Bob has thoroughly enjoyed the many challenges involved in establishing, with limited funds, the Department IT system with his fellow IT fanatics and a great technical staff. He recalls the changes from punched paper tape and cards, serial terminals, hand-cranked calculators through solid state electronic calculators to HP scientific and then programmable calculators, a series of UNIX machines, and being presented with a roll of Ethernet cable to wire up the old building (including crawling round the under-floor space).

Bob recalls the enduring friendships he made through teaching Engineering Mathematics. In those days Dr Mary Harding ruled and was much beloved by the Engineering students. Bob taught accountants (in suits) in the evenings in the old room D on the town site (now the air space in the Court Theatre). He also recalls four 8am lectures a week with a computer science and a numerical course. Despite the workload, he found the Department to be a great place to work in and, as more staff arrived, it became a wonderfully collegiate environment.

In 1973 Bob went on leave to Essex University where he completed a second Masters degree, with Professor Charles Broyden, a world leader in numerical linear algebra. On his return to Canterbury, he introduced modern applied linear algebra courses to this Department. He notes that in many instances he worked up numerical course notes, often from journal articles, to be subsequently pleased when the numerical gurus produced textbooks mirroring his efforts.

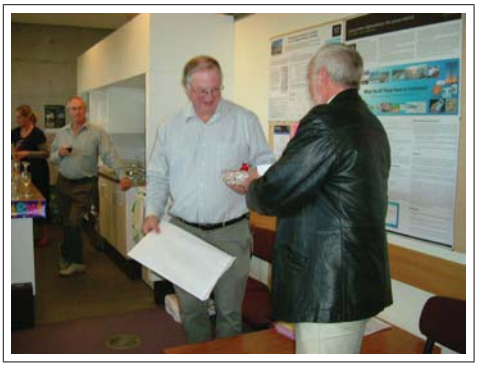
Bob has had a long connection with mathematical education and served on the former National Curriculum Steering Committee for many years, being heavily involved in syllabus construction for the Mathematics Bursary courses. He co-authored textbooks and was an examiner for Bursary Applied Mathematics and Chief Examiner for the NZEST Scholarship Mathematics with Statistics paper for 5 years. He also introduced the innovative Keller Plan teaching programmes in his courses and recalls the exceptional student response.

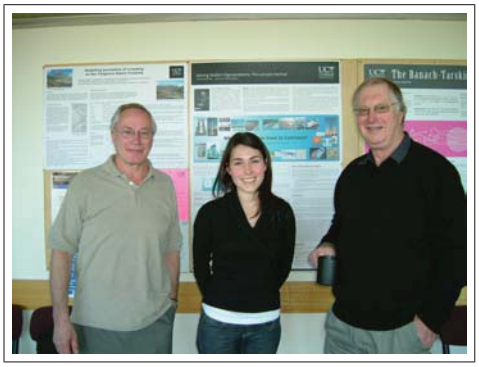
In 1982, as a result of attending an international workshop on numerical mathematics in Toronto, Bob brought MATLAB to New Zealand and instituted a teaching programme using MATLAB here at Canterbury.

In addition to his teaching duties, Bob has been our Library Liaison Officer for the past 30 odd years and takes considerable satisfaction at the current state of the Mathematics and Statistics collection. As Chair of the Facilities Committee, Bob has been heavily involved in the administration of this building, including the planning and monitoring of the Erskine building project itself. He has also been secretary of the staff club. On the sporting side, he has had many years of involvement with soccer, as a player, coach and administrator, and is still actively involved in social tennis.

Memorable characters during Bob's time with the Department range from the larger-than-life HoD Professor Gordon Petersen to Hubert, the equally large cat who lived in the old Maths Building alongside an English sheepdog and sundry rats, courtesy of the neighbouring Psychology Department! He remembers a very social department with regular tennis sessions, office cricket, interdepartmental cricket and bridge contests, and on a more cultured note, morning and afternoon tea breaks in the old common room with such doyens of the NZ art world as Bill Sutton, Doris Lusk, Don Peebles and Tom Taylor. On a sadder note Bob recalls the pain felt with the tragic losses of colleagues who passed well before their time - Peter Bryant, Brent Wilson and Derrick Breach.

Bob feels the years have flown by and suddenly it is time to retire. He bows out in the knowledge that the Department is in good hands with the enthusiasm and abilities of the new generation of staff. Despite his official retirement, Bob is not lost to us yet. He remains as an Adjunct Senior Fellow and will continue with teaching and administrative commitments for the rest of this year in a temporary capacity.





(Left Image) Bob receiving his retirement present from former HoD David Wall. (Right Image) Ian Coope (left) and Bob (right) with their PhD student Rachael Tappenden (middle).

(Left Image) Bob and his son Roland in Hong Kong. (Right Image) Bob with Professor San Shing Choi at Nan Yang University in Singapore.

*local news continued . . .*

## UNIVERSITY OF WAIKATO

### DEPARTMENT OF MATHEMATICS

Kevin Broughan and Ian Craig have now finished their periods of study leave. During his study leave, Kevin presented invited lectures on his work with Ross Barnett on the Riemann zeta function at the Universidad Nacional Autónoma de México (UNAM) Mathematics Institute, at the AMS sectional meeting at Urbana-Champaign in the special session on dynamical systems and number theory, at the Number Theory Seminar at Rutgers University, and at the Number Theory Seminar at the City University of New York. He also presented a contributed paper at the AMS meeting on his work with Zhou Qizhi on flat and thin primes. He undertook research into problems in number theory with Florian Luca of UNAM and Steve Miller of Rutgers. As part of his study leave, Kevin also spent nearly two weeks at Macquarie University in Sydney.

Ian Craig returned from the UK after spending about seven weeks there. Most of this time was spent at the University of Dundee. Now on study leave is Ian Hawthorn. He will be spending time in the department as well as visiting several universities in Australia.

Sean Oughton is shivering through winter again after returning from three warm weeks in France and Italy in June/July. He spent the first week at the Solar Wind 12 conference in St Malo. After that he was in Florence, collaborating on a project that he and three others had begun at the Solar Wind 11 meeting in 2005. They hope to have a paper on this work submitted well before the Solar Wind 13 meeting in 2012! The croissants were better in France, but the coffee superior in Florence. Even the 35 (euro)cent vending machine coffee is a quality espresso.

Nicholas Cavenagh attended the 2009 British Combinatorial Conference from July 4th to July 8th at St Andrews. He presented a paper entitled "Multi-latin squares" which has been submitted to the Conference Proceedings. Peter Cameron gave a very interesting plenary talk highlighting the importance to statisticians of eigenvalues of the Laplacian matrix of combinatorial designs. The conference excursion was to Falkland Palace which includes the world's oldest tennis court, used by Mary Queen of Scots.

Yuri Litvinenko spent about a week and a half at the University of New Hampshire to work on ongoing projects. Ernie Kalnins spent nearly three weeks from late June to mid-July in Russia. While away, he attended the XIII International Conference on Symmetry Methods in Physics held in Dubna, July 6–9. He presented a talk titled "Models of quadratic algebras suggested by superintegrable systems". Ernie comments that this conference is a very useful one for researchers involved in the study of superintegrability.

Student EFTS in the department are over 25% higher than last year. The main contributor to this growth is probably the recession.

#### Seminars

**J. Chao** (Seoul National University), "Unsolved problems in solar prominences".

**T. Stokes** "Programs as algebras".

**K. Broughan** "Three topics in number theory from 2008: the factorial function, flat primes, and Lehmer's Euler phi function conjecture".

*Stephen Joe*

## VICTORIA UNIVERSITY OF WELLINGTON

### SCHOOL OF MATHEMATICS, STATISTICS AND OPERATIONS RESEARCH,
### *Te Kura Mā-tai Tatauranga, Rangahau Pūnaha*

Things have been buzzing along nicely in the School - we are now into our second half year. The MSOR Colloquia series, organised by Geoff Whittle to celebrate the new School, has been going really well - the talks have all been very well attended and well received. Richard Arnold, Rod Downey and Mark Johnston gave presentations before mid-year and in July Dillon Mayhew gave us his interesting answer to the question, "What is a matroid?". Coming up in September and October we have colloquium talks by Estate Khmaladze and Matt Visser to look forward to. More information about past and future MSOR Colloquia is available from: `http://msor.victoria.ac.nz/Main/MSORColloquia`.

Quite a bit of our news this time concerns research student and postdoc success stories - always nice to report! We have five new PhDs to celebrate, following the trend started by the School's first successful PhD completion, Thomas Suesse, reported in the last newsletter. Keng Meng (Selwyn) Ng has accepted a van Vleck postdoctoral fellowship to the University of Wisconsin-Madison beginning

in September 2009. Selwyn's thesis was entitled, "Computability, Traceability and Beyond" and his PhD was supervised by Rod Downey. Selwyn gave an invited talk at the Computability in Europe 2009 meeting in Heidelberg on 23 July. Matt Visser supervised two recent PhD completions: Celine Cattoen with her thesis,"Applied mathematics of spacetime and space+time: Problems in general relativity and cosmology" and Petarpa Boonserm with "Rigorous bounds on Transmission, Reflection, and Bogoliubov coefficients". Celine will be taking up a postdoctoral position at the University of Alberta in Edmonton, Canada, while Petarpa will be starting in a junior position in the Mathematics Department at Chulalongkorn University in Bangkok, Thailand. Galym Akishev's thesis, "Monadic Bounded Algebras" was supervised by Rob Goldblatt, while Shaochuan Lu was supervised by David Vere-Jones and David Harte in his work entitled "Extensions of Markov Modulated Poisson Processes and Their Applications to Deep Earthquakes". Congratulations to all of them! Also, Deborah Crook is about to complete her Masters thesis and then she will be heading off to Pennsylvania State University to take up a PhD scholarship.

Antonio Montalban, recently a postdoctoral fellow here under Rod Downey, has been awarded the prestigious American Mathematical Society Centennial Fellowship for the 2009-2010 academic year. The fellowship is presented annually, for excellence in research achievement. The stipend for his fellowship is US$75,000, plus an expense allowance of US$7,500. More information can be found at `http://www.ams.org/ams/press/cent-fell-09-10.html`.

George Barmpalias, one of Rod Downey's current postdocs, will be starting in a new position at the University of Amsterdam in September. George recently gave an invited talk at the Computability in Europe 2009 meeting in Heidelberg on 22 July. Rod's newest postdoc is Asher Kach from the University of Connecticut, who arrived in July. As well as working with Rod, Asher will be working with Steffen Lempp from University of Wisconsin-Madison, since Steffen is on sabbatical with us until December, visiting Rod. In May Rod was invited to take part in the Royal Society's Speakers Science Forum at Parliament Buildings, while in July Rod jointly chaired (and organised) the Special Session on Relative Computability at the Computability in Europe 2009 meeting in Heidelberg.

Matt Visser spoke in May at Te Papa on "Dark matter, dark energy, and the accelerating universe". Matt's talk was part of an event run by the Royal Astronomical Society for the International Year of Astronomy. Matt's latest (edited) book appeared earlier this year too, "The Kerr spacetime: Rotating black holes in general relativity". Joining Matt with a new book was Estate Khmaladze, whose sole-authored volume "Statistical Methods for Demography and Life Insurance" was published in Moscow this year.

John Haywood had a very pleasant trip south to Dunedin in mid-May to give a seminar, "Memoryless reigns of the 'Sons of Heaven': exponential rule lengths revealed and explained". Quite soon after that, Bhramar Mukherjee made a much longer trip south, coming from the University of Michigan to visit Ivy Liu for 10 days. While she was here, Bhramar worked with Ivy and with Yuichi Hirose, and several of us went out for a very enjoyable dinner. In June Stefanka Chukova and Richard Arnold appeared on various radio and TV news shows and in The Dominion Post newspaper, regarding the chances of winning the Big Wednesday $35M jackpot. This generated a lot of national interest in probability.

Rob Goldblatt has recently returned from a half-year sabbatical and Mark Johnston has recently left for a similar length of time. Mark reports that he is enjoying himself at the University of Southampton where he is working with Chris Potts on combinatorial optimisation problems. Mark McGuinness is enjoying his sabbatical at the Mathematics Applications Consortium for Science and Industry, Department of Mathematics and Statistics, University of Limerick. His two PhD students Jonathan Crook and Nicole Walters have just returned to Wellington after a couple of months visiting with Mark in Ireland. Mark reports he has attended four Study Groups in five months, a personal record! He is working on exploding rocks, exploding fuses, frothy milk and biofilms. Not necessarily in that order.

During July Geoff Whittle concurrently hosted James Oxley from Louisiana State University and Charles Semple from University of Canterbury, to work on matroids. In the first week of August Geoff and Dillon Mayhew attended the Banff International Research Station workshop on Applications of Matroid Theory and Combinatorial Optimization to Information and Coding Theory. Earlier, in June, Dillon organised the School's annual outreach sessions for high-school students. About 30 students attended, from all over the Wellington region. In addition to Dillon, the other speakers from MSOR were Noam Greenberg, Hung Le Pham, Nokuthaba Sibanda and Ken Pledger. Dillon spoke on computational complexity and the law of large numbers, Noam talked about the busy beaver function, Hung spoke about the difference between algebraic and transcendental numbers, Nokuthaba talked about various applications of sta-

tistical methods, and Ken talked about continued fractions and their applications.

As noted in April's newsletter, the School will be hosting the 60th Annual Conference of the New Zealand Statistical Association on 2-3 September 2009, with John Haywood the Conference Chair. There will be a total of 71 talks over the two days, including three plenary sessions and a set of five talks on Statistical Education. In addition there will be a one-day workshop on Semiparametric Regression given by Matt Wand (University of Wollongong) preceding the conference on Tuesday 1 September and a three-hour introduction to SAS Enterprise Guide software on the morning of Friday 4 September. Further details, including how to register and abstracts for all the talks, are available at the conference web page: `http://msor.victoria.ac.nz/Events/NZSA2009`. For other queries about NZSA 2009, please contact `John.Haywood@msor.vuw.ac.nz`.

One final thing that should be noted somewhere, so here it is - a world exclusive - the School of Mathematics, Statistics and Operations Research's crack Laser Force strike team comprehensively vanquished (3-0) the School of Politics and International Relations, on Friday 12 June. In a hot and smoky battle we easily triumphed, a fact that we can attribute (with some suitable accommodation of statistical uncertainty) to the fact that we had some women on our team whereas Politics did not, and we had our Head of School (Megan Clark) prepared to enter into the fray, leading by example. The battle was a good natured challenge that grew out of the TV1-TV3 'rival' 2008 election-night coverage, with our own Richard Arnold calling the result for Television New Zealand (TV1).

### SEMINARS

**Elizabeth Winstanley** (University of Sheffield), "Furry black holes"

**Rod Downey** (VUW), MSOR Colloquium, "When does a problem have a solution: A logician and computability theorist's view"

**Sione Paea** (VUW), "A Kinetic Monte Carlo Algorithm for Nanocrystal Growth"

**Tim Stokes** (Waikato University), "Programs as Algebras"

**Mark Johnston** (VUW), MSOR Colloquium, "Insight from Visualisation in Combinatorial Optimisation"

**Arkadii Slinko** (University of Auckland), "Weighted and Roughly Weighted Simple Games"

**Dillon Mayhew** (VUW), MSOR Colloquium, "What is a matroid?"

**James Oxley** (Louisiana State University), "Chain theorems for matroids"

**Joerg Frauendiener** (University of Otago) "The spherically symmetric body in relativistic elasticity"

**John Haywood** (VUW), "Here today, gone tomorrow? Exponential reign lengths revealed and explained"

*John Haywood*

## INDUSTRIAL RESEARCH LIMITED

Random jottings from Applied Maths, Industrial Research, Gracefield.

Shaun Hendy has given seminars at MoRST, AJ Park & Associates, and Motu on 'Innovation, Inventors and Increasing returns to scale: what can we learn from a patent database'. The talk is based on an analysis of the topological properties of the co-patenting networks that are visible between inventors through patent databases. As well as being interesting mathematically, these networks provide an interesting perspective on the economic development of the OECD countries over the last 30 years.

Shaun also helped organise a New Zealand Microfluidics workshop in June in Wellington together with Dr Geoff Willmott in the IRL Micro and Nanofluidics team. This workshop, followed up a similar workshop in Australia, which was aimed at establishing an Australia-New Zealand Microfluidics grouping (`www.anzmicrofluidics.org`).

Bridget Ingham hosted Peter Kappen from La Trobe University (Melbourne) on 18-19 June. Peter also gave a seminar on 19 June, 'The structure of iron in multi-walled carbon nanotubes: linking EXAFS data to growth parameters'.

B. Ingham, S. Dickie, H. Nanjo and M. F. Toney, "In situ USAXS measurements of titania colloidal paint films during the drying process", Journal of Colloid and Interface Science vol. 336 (2009) p. 612-615.

Graham Weir presented a Short Course comprising of three 50 minute lectures at the AMSI/M ASCOS/UNESCO Industry Workshop "Future Models for Energy and Water Management" at the Queensland University of Technology, Brisbane, 20 - 22 July, 2009. Over 50 attendees heard many presentations on the interdependence between energy and water, and of the worsening situation regarding access to water resources, both locally, and globally.

Most of the presentations will be available on the AMSI website.

We have two new French interns, Yannick Lauroua and Julien Grimault, who are engineering students from ENSAM in Bordeaux. They will be working with John Burnell and Warwick Kissling on some geothermal topics until the end of the year.

**SEMINARS**

**Robin Willink** (3-Feb-2009) "Mirror, mirror"

**Brent Walker** (17-Feb-2009) "A rough introduction to density functional theory"

**Philip Zhang** (24-Feb-2009) "Introduction to AMDiS with melting models"

**Nicola Gaston** (10-Mar-2009) "Impressions of the AMN4 conference in Dunedin"

**Aruna Awasthi** (17-Mar-2009) "Identificaton of melting transitions in the nanoclusters"

**Bridget Ingham** (24-Mar-2009) "Getting even more out of SAXS-I"

**Shaun Hendy** (31-Mar-2009) "Highlights of the APS March Meeting 2009"

**Warwick Kissling** (7-Apr-2009) "Zernike Polynomials and their applications is optics and astronomy"

**Bridget Ingham** (14-Apr-2009) "Getting even more out of SAXS-II"

**Sione Paea** (21-Apr-2009) "A Kinetic Monte Carlo Algorithm (KMC) for Nanocrystal Growth"

**Nat Lund** (28-Apr-2009) "Slippery Issues"

**Donal Krouse** (5-May-2009) "Simulation of salt-film formationduring localised corrosion in a chloride environment"

**Roger Young** (12-May-2009) "Wave Propagation through a Micro-structured Solid-I"

**Roger Young** (19-May-2009) "Wave Propagation through a Micro-structured Solid-II"

**Dion O'Neale** (26-May-2009) "Symplectic integrators preserve periodic orbits"

**John Burnell** (2-Jun-2009) "Model Reliability"

**Barry Cox** (9-Jun-2009) "A polyhedral model for boron nitride nanotubes"

**Catriona Sissons** (16-Jun-2009) "Not Patently Obvious : Patents and Networks"

**Graham Weir** (23-Jun-2009) "Mathematical Models of Geothermal Fields and phenomena - Part 1"

**Graham Weir** (30-Jun-2009) "Mathematical Models of Geothermal Fields and phenomena - Part 2"

**Graham Weir** (7-Jul-2009) "Mathematical Models of Geothermal Fields and phenomena - Part 3"

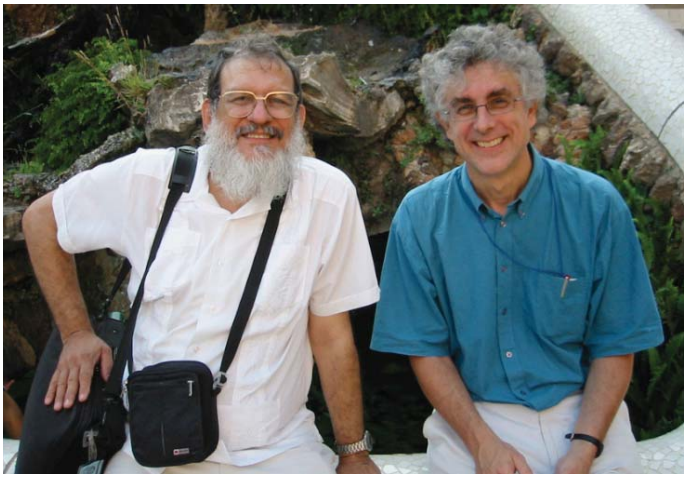
**Peter McGavin** (14-Jul-2009) "A brief introduction to Python"

**Kit Withers** (28-Jul-2009 ) "Accurate Bayesian inference"

*Kit Withers*

# OBITUARIES

## Keith John Worsley (1951-2009)



Keith Worsley (right) with Pedro Antonio Valdes-Sosa - taken in Barcelona in 2004 by Keith's brother David

We are sad to note the death of Professor Keith Worsley, who died in Chicago on 27 February 2009 aged 57, after a brief struggle with islet cell cancer.

Keith John Worsley was born at Littleborough in Lancashire on 1951 October 15. When he was aged 13 the Worsley family moved to New Zealand, and they enthusiastically adopted the New Zealand way of life. Keith attended Auckland Grammar School and received all of his tertiary education at the University of Auckland, graduating as BSc(1972), MSc(1973) and PhD(1978). At the time of his death, Keith was Professor of Statistics at the University of Chicago and James McGill Professor of Mathematics and Statistics at McGill University in Montreal. He was a world leader in research on the geometry of random images and its applications to brain mapping and astrophysics, and his work was recognized with many awards including the Gold Medal of the Statistical Society of Canada (2004), Fellowship of the Royal Society of Canada (2003), and Honorary Fellowship of the Royal Society of New Zealand (2008).

Keith spent much of his working life at McGill University, collaborating with colleagues in the McConnell Brain Imaging Centre at the Montreal Neurological Institute. He made many fundamental contributions to the field of Human Brain Mapping in the statistical analysis of functional and structural brain imaging data, beginning with his seminal 1992 paper on the applications of Random Field Theory in the analysis of PET activation experimental data. He subsequently extended these approaches to the analysis of fMRI and structural MRI data, incorporating the time domain and scale space. Keiths approach to these questions was a unique mix of probability theory, statistics, geometry and computer science. In his work on the maxima of smooth random fields, he uncovered elegant connections between smooth random fields and classical integral geometry. He also developed publicly-available software packages for volume-based (fMRIstat) and surface-based (surfstat) data analysis that are widely used in the Human Brain Mapping community. In addition to his work on random fields, Keith made important contributions to a number of other areas of statistics, including multiple testing and change point problems.

Keith maintained close links with New Zealand throughout his life and visited regularly. At the time of his death, he was a member of the Advisory Board of the NZ Institute of Mathematics and its Applications, and he served on the Mathematics and Information Sciences Panel for the latest PBRF round. He will be greatly missed.

*Alastair J. Scott*

# Mavina K. Vamanamurthy (1934-2009)

Photograph of Mavina K. Vamanamurthy (right) with Dr Ramankutty, 1971.

Associate-Professor Mavina K. Vamanamurthy, known to all as Vaman, was born in Mysore, India, on 5 September 1934 and he died on 6 April 2009. He served the University of Auckland as senior lecturer and associate professor for nearly 30 years, earning a reputation as a distinguished analyst and topologist and meticulous teacher. He was the first person of Indian ethnicity to be promoted to associate professor at the University of Auckland. The NZMS elected him as a Fellow in 1997.

Vaman's University training began at the University of Mysore, from which he completed B.Sc.(Hons) and M.Sc. degrees, both with first-class honours in Mathematics. Later as a Fulbright Scholar he travelled to the University of Michigan in 1964 and there completed a Ph.D. degree in quasiconformal analysis. He joined the Auckland Mathematics Department in August 1971, towards the end of a wave of significant expansion in the Department. Dr Ramankutty had arrived earlier in that month, and the photograph (by Garry Tee) shews both of them late in August 1971, at the farewell ceremony for Frank Anger.

Many of we younger ones looked to Vaman to share his wisdom, especially in teaching and how best to present topics. One striking feature of Vaman's research output is the large number of his co-authors: about 25, ranging from colleagues in the Auckland Mathematics Department to mathematicians from all over the world. One third of his publications are joint with his Auckland colleague Ivan Reilly, and those are all in topology, Vaman having become interested in topology after he arrived in Auckland. He did not neglect his original field of quasiconformal analysis, though. He had a very successful collaboration with Glen Anderson of USA and Matti Vuorinen of Finland in their 20 joint papers, and they described many fine discoveries in their very good book "Conformal invariants, Inequalities, and Quasiconformal Maps", John Wiley & Sons, New York 1997 (MR1462077). Vaman's role in joint research was twofold: as an active participant and as a catalyst to bring out the best in his collaborators. For his research he received the NZMS Research Award in 1997.

Vaman had many interests outside University. He was very involved in the wider Indian community, in particular in promoting the use of the Kannada language, presenting weekly in that language on the local radio for a number of years, and promoting the performance of Indian music in New Zealand. He was also a keen player of badminton and follower of cricket: even in his final days he was asking for frequent updates of the latest test match between India and New Zealand.

For more about Vaman you may consult the Centrefold of the NZMS Newsletter Number 78, April 2000.

*David B. Gauld*

# Mathematicians on Banknotes

The poster for the University of Auckland Department of Mathematics course on "Mathematics of Money" displays banknote portraits of Newton and Abel. A few other mathematicians have been portrayed on banknotes: Descartes, Pascal, Huygens, Boskovic, Euler and Gauss. And now, Ivan Reilly has returned from Turkey and presented me with a newly-issued banknote for 10 Lirasi, portraying the Turkish mathematician Cahit Arf (1910-1997).

He is known for the Arf invariant of a quadratic form in characteristic 2 (applied in knot theory and surgery theory) in topology, the HasseArf theorem in ramification theory, Arf semigroups, and Arf rings. Cahit Arf's "Collected Papers" were published in 1990, by The Turkish Mathematical Society.



*Garry J. Tee*

# NOTICES

## NOTICE OF THE NZMS ANNUAL GENERAL MEETING

The Annual General Meeting of the New Zealand Mathematical Society will be held during the New Zealand Mathematics Colloquium at Massey University in Albany (8th-10th December). Items for the Agenda should be forwarded by Tuesday the 1st December to the New Zealand Mathematical Society Secretary.

*Winston Sweatman*

## CALL FOR NOMINATIONS FOR NEW ZEALAND MATHEMATICAL SOCIETY COUNCIL POSITIONS

Nominations are called for 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 Tuesday the 1st of December 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.

*Winston Sweatman*

# CONFERENCES

## 2009 New Zealand Mathematics Colloquium

Tuesday 8th-Thursday 10th December, 2009
Massey University, Albany
Website: http://nzmc2009.massey.ac.nz

This year the Colloquium will be hosted by the Institute of Information and Mathematical Sciences at Massey University's Albany Campus.

Plenary Speakers:

- Shaun Cooper, Massey University (Albany)
- Mike Hendy, Massey University (Manawatu), NZMS Lecturer
- Shaun Hendy, MacDiarmid Institute for Advanced Materials and Nanotechnology (Wellington)
- Kerry Landman, University of Melbourne, ANZIAM Lecturer
- Alan Reid, University of Texas (Austin), NZIAS Lecturer

Schedule of Events:

- Registration Get-together: evening of Monday 7th December
- Colloquium Talks: Tuesday 8th December-Thursday 10th December
- Colloquium Welcome Reception and Poster Session: evening of Tuesday 8th December
- Tour and Colloquium Dinner: afternoon and evening of Wednesday 9th December
- Last Session: expected to finish 2.45pm Thursday 10th December (followed by afternoon tea).

The Aitken Prize for the best student talk will be awarded at the Colloquium Dinner.

Registration and Abstract submission will be online via the conference website (http://nzmc2009.massey.ac.nz).

Contact Details: In the first instance please send general enquiries to the Conference Administrator: Michelle Campbell (`m.l.campbell@massey.ac.nz`).

Deadline: 2nd November 2009 (Abstract submission and early-bird registration).

Members of the Organising Committee and the Institute look forward to welcoming participants onto our beautiful campus.

*Winston Sweatman, Conference Director*

# International Congress of Mathematics 2010, Funding Available

International Congress of Mathematicians ICM2010 to take place in Hydrabad India from August 19th to 27th, 2010.

I attended the International Congresses in Berlin in 1998 and Madrid in 2006 and found them to be very positive and inspirational events. See the report in the Newsletter, December 2006, page 25.

A great deal of effort goes into the selecting of invited speakers who are constrained to make presented lectures accessible to general mathematical audiences, and not focus too acutely on their own work. In my experience, contributed papers are very well received with excellent audiences.

Of course there is the drama surrounding the Fields Medals, which are announced at the opening ceremony. With an audience of over 4000 mathematicians, this ceremony can be quite exciting. In 1998 we had the embarrassment of Andrew Wiles being denied the honour (as the organizers squirmed) and in 2006 the world press reaction to the Perelman rejection. Who knows what drama there will be in 2010!

As well as the invited, plenary and contributed lectures there are round tables, displays and special sessions for such topics as video mathematics and mathematical software demonstrations. In Berlin there was a room full of posters giving the untold stories of the not-so-famous mathematicians who suffered under the Nazi terror. In Madrid a fractal art gallery was particularly impressive.

Conference tours and activities for accompanying persons are a strong tradition and a good way to make the conference a 'family event' - my wife went to both and participated in these, making new friends from the international mathematics community.

The NZMS Council has agreed to provide financial assistance to graduate students and others to help them attend the 2010 meeting under the normal funding arrangements. The small number of NZ based mathematicians, who have attended these meetings in recent years, barely more than the funded IMU delegate, is a pity, especially since the quality of these meetings is so high, and their place in the mathematics calendar of events paramount. You are strongly encouraged to participate! Pre registration is now open and formal registration begins 1st January 2010.

- Applications for financial assistance: `w.sweatman@massey.ac.nz`
- Financial assistance NZMS web page: `http://www.math.waikato.ac.nz/NZMS/support.html`
- For ICM2010 information and registration:
  `http://mathstat.uohyd.ernet.in/events/forthcoming/icm2010/`

*Kevin Broughan*

# Student support to attend MISG 2010, RMIT University, Melbourne

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 Sunday, 7 February 2010  Friday, 12 February 2010. 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, students should complete the usual NZMS financial application form available at `http://www.math.waikato.ac.nz/NZMS/support.html` marking the entry:

"Type of Assistance Sought": Travel to MISG10

You will require all the following:

1. Contact details (name, address, email).
2. Current programme of study.
3. Details of society membership of NZMS.
4. Estimated total expenditure (including a breakdown of this expenditure).
5. A supporting statement from Supervisor, Head of Department, or similar.

The form is to be sent to the address below before the deadline of Wednesday, 9 November, 2009. The amount of money available for individual students will be decided shortly after that date.

Details of further support available for accommodation local costs and other information will be found on the MISG internet site `http://www.rmit.edu.au/maths/misg`.

(Please note that MISG funding is separate from the usual process of financial support provided by the NZMS and will have no effect on future eligibility for such support.)

Details of membership of the NZMS are available at `http://www.math.waikato.ac.nz/NZMS/membership.html`.

*Winston Sweatman*

RMIT UNIVERSITY

2010

# MISG WORKSHOP

The annual MISG workshop brings together leading mathematicians and statisticians from universities, the public and the private sector from across Australia and around the world to tackle complex technical problems facing Australian businesses and industry.

**Venue**

RMIT University's City campus Melbourne

**Dates**

Sunday 7 February to Friday 12 February 2010

**Further information**

For more information or to express your interest in being involved please email misg@rmit.edu.au

**www.rmit.edu.au/maths/misg**

School of Mathematical and Geospatial Sciences

MISG 2010

The MISG workshop aims to provide practical, working solutions for real-life problems using methods from the mathematical sciences. Selected companies are given the opportunity to utilise the collective knowledge and resources of more than 150 mathematicians from Australian and international tertiary institutions, the CSIRO and other government organisations, as well as the private sector. They bring with them a variety of skills from many areas of mathematics, and it is this multi-faceted approach to problem-solving that makes MISG such a dynamic and productive forum.

Since it was founded in 1984, the MISG has worked with a diverse range of more than 85 Australian businesses and industries, ranging from large multinational conglomerates to small-to-medium enterprises. The MISG has worked on more than 150 different projects spanning a broad spectrum of industry sectors—including mining, car manufacturing, railways and freight, manufacturing, metal processing, food and beverages, oil and gas, utilities, biomedical science and technology.

In the past successful projects have included:

- Strategic planning and optimisation in an open cut coal mine
- Pinpointing principal moments of inertia in a automotive engine assembly
- Modelling of open vat red wine fermenters
- Modelling the cooking process of a single grain of cereal
- Blending of lubricants in petroleum production
- Modelling the flow of pesticides through bunches of grapes
- Analysing the impact of weather on power supply disruptions in an electricity network

Every year, a large number of companies are invited to submit projects to MISG, after extensively consulting, MISG select eight to ten appropriate problems from a range of different industries to be presented at the workshop.

Selected industry representatives liaise with MISG researchers to define and clarify the scope and nature of each project. Each project is then presented to the MISG workshop who over the course of several days work in teams to develop solutions for each problem, and present a solution tailored to the needs of the industry participant. The nature of the solution will vary from project to project, depending on the nature and complexity of the project, and may take a range of forms such as a set of equations, experiments or a software program.

Where possible, within the timeframe provided, MISG may be able to develop a complete solution to a problem. In some instances, due to the complexity of the problem, it may be necessary for MISG to develop a procedure or system which allows the industry participant to develop solutions at a later date. Participating companies may also have the opportunity to consult further with MISG researchers following the workshop.

To present a project to the MISG workshop, participating industries must pay a registration fee of $7000 (plus GST). This fee covers all work before and during the workshop, all associated costs of the event, a summary, and a complete technical report. The fee does not cover the travel or accommodation expenses for industry representatives who attend the workshop. MISG's researchers volunteer their expertise.

The 2010 MISG workshop will be hosted by the School of Mathematical and Geospatial Sciences.

# 50th International Mathematical Olympiad

In July I travelled with the New Zealand team to the 50th International Mathematical Olympiad in Bremen, Germany. My role this year was as an observer: I was there to shadow NZ leader Michael Albert (University of Otago), so that I could learn the role of leader and fill it at a future IMO. Also travelling with the team were Heather Macbeth (University of Auckland) as deputy, and May Meng (King's College) as manager.

Malcolm Granville (NZL) and Harm Campmans (NLD) working together during joint training in Apeldoorn.

We left New Zealand on July 5th and travelled to Apeldoorn, in the Netherlands, for a joint training camp with the Dutch team. The connection? "New Zealand" and "Netherlands" being close alphabetically, Michael had got to know Dutch leader Quintijn Puite, and Heather Dutch deputy Birgit van Dalen, at previous IMOs. The teams were fairly evenly matched and the camp was enjoyable and profitable for all — although we were certainly envious of the ease with which the Dutch could gather in one place for training, owing to their smaller geography!


Voting during a problem-selection meeting of the IMO jury.

Five days in to the week-long camp Michael, Quintijn and I left by train for Bremen and the problem-selection phase of the IMO. On arrival in Bremen we were whisked off by bus to Bremerhaven, about 50km from Bremen at the mouth of the Weser. We would be secluded there for the next six days, forbidden to communicate with our teams — beyond waving to them from a balcony at the opening ceremony! — until they had sat both exams.

Michael was pleased to see a problem of his had made it on to the shortlist of 30 that the six for the competition would be chosen from. We were soon stuck into the fun but difficult work of trying to solve as many of the shortlist problems as we could, before we were given the solutions the next day. As you can imagine the problems are rather difficult! I made progress on a few, but only managed to completely solve about three; Michael however did rather better.


The team on stage during the "Parade of Teams", at the opening ceremony.

On our third day in Bremerhaven the jury meetings began. As an observer I was permitted to attend but not speak at the jury, and I soon established a regular seat at the back next to James Cranch, an observer from the UK. This was my first time at the IMO since I had attended as a member of the NZ team in 1990 and 1991, and it was fascinating to see a side of the IMO that had been hidden to me then. The jury was large — this year for the first time there were over 100 countries taking part — but the chair kept things running smoothly, and the problems for the competition were chosen much faster than I'd expected.

The Bremen "Altstadt" (old town).

The next few days passed in further jury meetings — approving the translations into the more than 50 required languages, and settling the marking schemes — and then the opening ceremony, at which break dancing replaced the folk dancing some leaders had predicted. Finally the first day of competition was upon us. For the team in Bremen this meant four and half hours tackling the first three problems; for Michael and me in Bremerhaven it meant a jury meeting in the morning to answer questions from contestants, and then a nail-biting wait until the scripts arrived that evening. When they finally came in we were pleased to see that most of the team had made substantial progress on Problem 1, although not as much as we'd hoped on the other two.

Heather and I present the team's solutions to Problem 4 to the co-ordinators (at right).

After the second day of competition Michael and I were relocated to Bremen, along with all the other leaders, where we were reunited with Heather, May and the team. Unfortunately the second day of competition had proved tougher than the first, and most of the team were feeling despondent.

May enjoys a "beach basket" during the excursion to Wangerooge.

With the competition over the team enjoyed a well-earned rest and the company of the other 559 contestants, while Michael, Heather and I prepared for "co-ordination" — the process of agreeing on their exam marks with representatives of the host country. This would take place in half-hour appointments, one for each problem, and to make sure the team got every mark they deserved it was crucial that we go over their scripts extremely carefully. This was particularly important for Malcolm, who had done very well on two problems and stood a good chance of getting a bronze medal.


The team. From left: Ben Kornfeld (King's College), David Shin (Burnside High School), Stephen Mackereth (crouching; King's College), Malcolm Granville (Auckland Grammar School), Michael Wang (Macleans College), Ha Young Shin (Christchurch Boys' High School).

The co-ordinators were all extremely competent and well-versed in their problems, and at each meeting we were able to come to an amicable agreement — often securing a few points more than the co-ordinators' initial assessments. Naturally, we had a greater interest in looking through our

team's scripts thoroughly, and more time to do it in! Michael in particular was especially good at this, and I could tell I was going to have big shoes to fill as leader in a year or two. Malcolm's score was 16, which we were reasonably confident would be enough for a bronze, but we'd have to wait until the final jury meeting the next day to find out...

It was! The cut-off for bronze was set at 14, putting Malcolm two points over and giving two medals (a silver and a bronze) to our friends the Dutch. In addition Ben, David and Ha Young received honourable mentions.


Our bronze medallist.

Now we could all relax and enjoy the events planned for the last few days of the IMO: the 50th anniversary celebration, a trip to Wangerooge on the North Sea (I'm glad I wasn't the one tasked with planning an excursion for twelve hundred people!) and of course the closing ceremony and farewell party on the last day. It passed all too quickly, and before we knew it we were saying goodbye to new friends and heading home.

Michael and Heather receive medals of their own — chocolate coins — as thanks from the team.

*The 51st IMO will be held next July in Astana, Kazakhstan. The selection process for the NZ team begins next month with the "September Problems", which will be available on the NZMOC website* www.mathsolympiad.org.nz *shortly.*

*Chris Tuffley*

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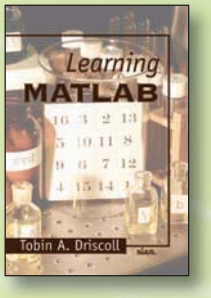


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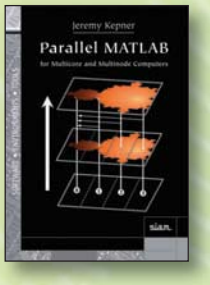


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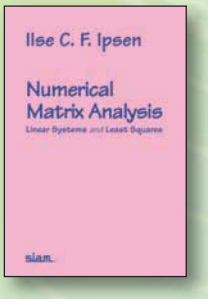


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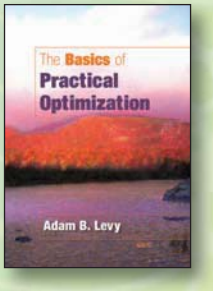


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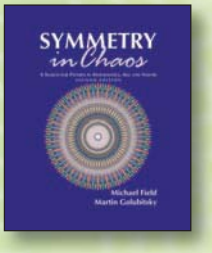


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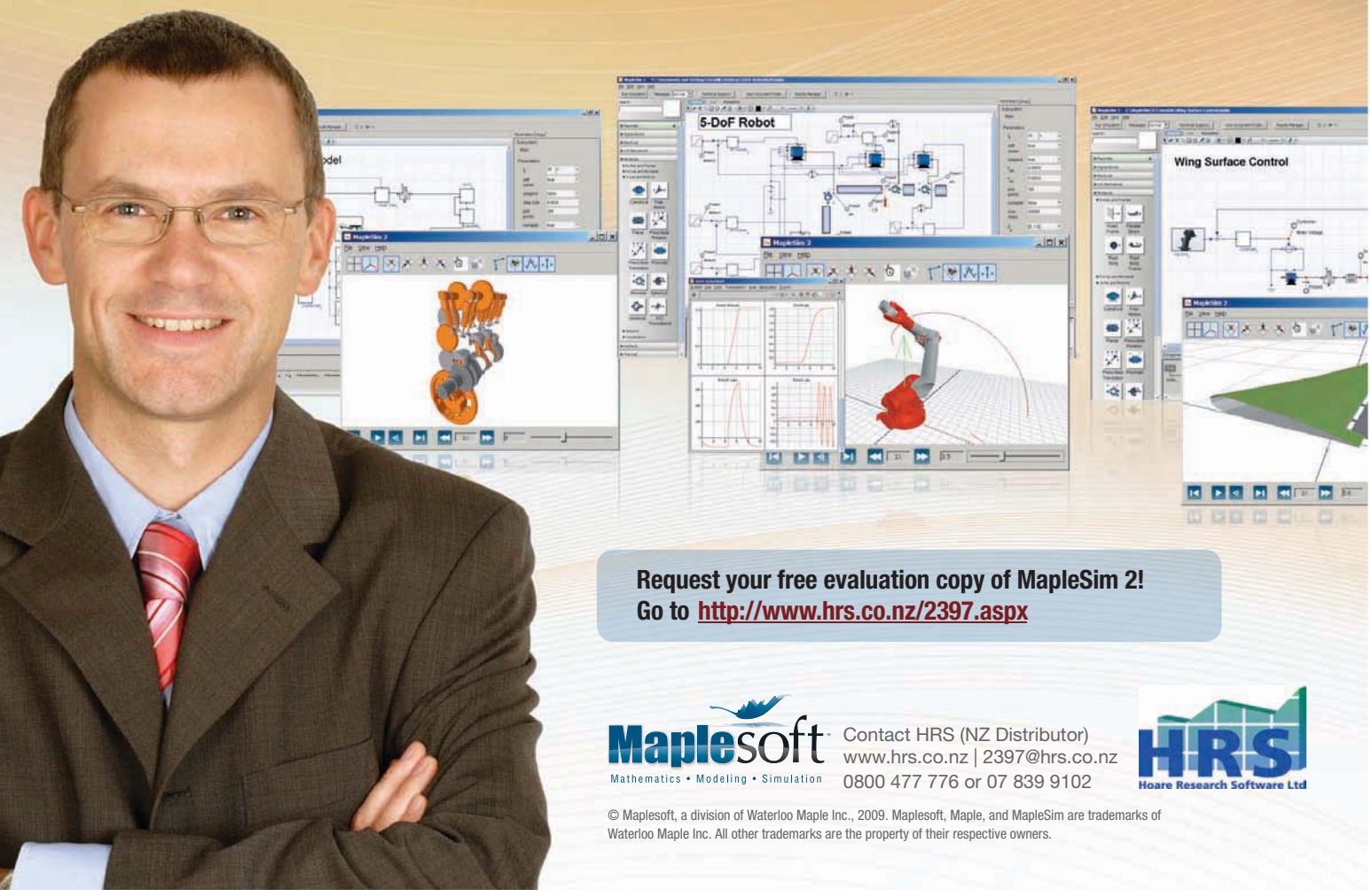


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