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NEWSLETTER

OF THE

NEW ZEALAND MATHEMATICAL SOCIETY

Contents

PUBLISHER'S NOTICE

This newsletter is the official organ of the New Zealand Mathematical Society Inc. This issue was edited by Mark C. Wilson with paid proofreader assistance. Editorial enquiries and items for submission to this journal should be submitted as plain text or LaTeX files with "NZMS newsletter" in the title of the email to mcw@cs.auckland.ac.nz.

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The newsletter is available at: http://nzmathsoc.org.nz/?newsletter

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EDITORIAL

In this issue we present, among other things, research articles from NZMS prizewinners, a "Where are They Now?" feature that may surprise, an interview with the president of the IMU, information from the Vice-President of RSNZ, a full President's Report and list of prizewinners for 2015, minutes of the 2015 AGM, and a report on the Aitken Lecturer's tour of UK.

I assembled most of this issue while at the NZ Mathematics Colloquium in Christchurch. It was a strange feeling to be back on the campus where I was an undergraduate, too many years ago, and to see the mixture of old and new buildings. Attendance was smaller than desired, and I believe that members will receive a survey soon to try to determine why. My feeling is that NZ is small, and that NZMS should co-locate annual meetings with other societies in similar areas, such as NZSA and ORSNZ (the last two already co-locate a week before NZMS). I would like to see this collaboration grow into an umbrella group that has enough size and diversity to achieve some real political change in the way mathematical sciences are treated in NZ.

This issue is my last as Editor. I hope, and strongly believe, that I leave the Newsletter much better than I found it. It seemed to me in 2013 that it was in danger of dying an ignominious death. At least now it can be decided calmly and in due time whether or not it ought to be euthanized or nourished.

The new editors are Phillip Wilson, phillip.wilson@canterbury.ac.nz, and Miguel Moyers-Gonzalez, Miguel.MoyersGonzalez@canterbury.ac.nz, to whom all content from now on should be sent. I doubt they fully realize yet what they have taken on, and hope that they receive plenty of assistance from the community.

I extend thanks to those who have helped me during my time as editor, with special mention to Robert Mclachlan and Steven Galbraith, who never let me down. The working relationship with Presidents Graham Weir and Winston Sweatman and Secretary Emily Harvey of NZMS has been good. Alex James helped substantially in the early days. Proofreaders Tania Roblot and Alistair Abbott have improved production quality. Thanks also to those who have sent their good wishes and appreciation.

I will finish by setting the record straight on a misconception. Some apparently feel that I have chosen insufficiently many female Profile subjects. This has not been for lack of trying — I fully support the goal of eliminating conscious and unconscious bias in the profession, and in society as a whole. I simply couldn't get anyone to write about some whom I did try to cover. Also, the only female "Where are they now" we asked didn't reply, the only person approached who reacted in this way. I hope that the new editors will have more luck.

Mark C. Wilson

PRESIDENT'S COLUMN

I have now completed my term as President of the NZMS and my ninth year on Council. This year saw the 50th annual Colloquium meeting. The first was at Victoria University of Wellington in mid-May 1966. I attended my first Colloquium in 2002 at the University of Auckland and have attended all of the Colloquia thereafter. It is good to see familiar faces and also to see some new ones. It is great to have a national mathematics meeting like this.

Membership

We welcome new members. The current total membership is 227, down from last year's number. Again, I encourage supervisors to explain the benefits of NZMS membership to their students and to encourage them to join and remain members. Please can all members, student or non-student, tell new recruits to their departments about the NZMS.

I would like to record my gratitude to John Shanks in his continued, long and distinguished service as our Membership Secretary.

Activities

We have awarded travel grants to Chris Stevens, Leon Escobar, Timm Treskatis, Zahra Afsar and Anggha Nugraha. We provided grants in support of MINZ15 - the Mathematics-in-Industry NZ workshop and NZMASP15 - the New Zealand Mathematics and Statistics Postgraduate Conference.

There have been Forder, Aitken and Maclaurin tours this year. The Forder and Aitken lecture tours are reciprocal two-yearly exchanges between the London Mathematical Society and the New Zealand Mathematical Society which usually occur in alternating years. In March and April, this year, Endre Süli of the University of Oxford toured as the Forder Lecturer. I am grateful to Tom ter Elst who coordinated his Lecture tour. The reciprocal Aitken Lecturer was Steven Galbraith of the University of Auckland who toured the UK in October. The next Forder lecture tour will be in 2016 and will be given by Julia Gog of the University of Cambridge. It will take place in the second half of March and whole of April. Mick Roberts has kindly volunteered to coordinate her tour.

The Maclaurin lecture tours are reciprocal two-yearly exchanges between the American Mathematical Society and the New Zealand Mathematical Society. In September this year, Ingrid Daubechies of Duke University toured New Zealand as the incoming Maclaurin lecturer. I am grateful to Florian Beyer who coordinated her Lecture tour. James Sneyd, of the University of Auckland, toured the US in October and November of 2014 as the outgoing Maclaurin lecturer. The next outgoing Maclaurin lecturer will be Gaven Martin of Massey University who will tour the US in November of 2016.

The NZMS newsletter continues in its electronic form. I'd like to thank Mark Wilson for his service as newsletter editor during which time he has led a process of change. Mark took on the rôle in August 2013 and will step down after the December 2015 edition. We can welcome Miguel Moyer Gonzalez and Phil Wilson, who will be taking over as editors. Please give them your support.

The NZMS Women-in-Mathematics web page has been up for over a year. Thanks to Emily Harvey for setting up and maintaining that page. There is an e-mail list for those interested in hearing about events and news related to fostering gender equality in mathematics. Astrid an Huef is the coordinator and contact for the e-mail list. A networking event for men and women followed immediately after the AGM. There was also a panel discussion on "Parental leave, part-time status and negotiating these things" in the early afternoon on Wednesday of the Colloquium.

The NZMS Education Group has continued with Dillon Mayhew as its overall convenor and coordinator. The group has formed two subcommittees to focus on the particular topics of "Liaison between education sectors" and "21st century mathematics education". These are convened by Dillon and Stephen McConnachie, of Middleton Grange School, respectively. Stephen also coordinated the education afternoon at the Colloquium. The Group has set up an internet page within the NZMS site.

The first Mathematics-in-Industry for New Zealand (MINZ) Study Group took place in Albany mid-year directed by Graeme Wake. It was good to see a range of mathematicians participating, including many students. These events are enjoyable and instructive and they are free to attend. I would encourage all mathematicians to try them out and to encourage their students. There will be another MINZ-SG directed by Mark McGuinness and Graeme Wake in Wellington in the middle of next year.

The New Zealand Journal of Mathematics continues publication online. Back issues have been scanned and are also being made available online. I am grateful to David Gauld and the NZJM Committee. The NZJM provides both free publication and open access for authors. There is a prize, the Kalman prize for the best paper. I believe the NZJM is something the New Zealand mathematical community can take pride in. NZMS members are encouraged to support the journal.

Generous donations from the Margaret and John Kalman Charitable Trust and from the Mathematical Chronicle Funds have funded the Butcher-Kalman Speaker at the NZMS Colloquium. The inaugural Butcher-Kalman Speaker was Adam Day of Victoria University of Wellington.

The NZMS Speaker was Rick Beatson of the University of Canterbury. The other NZMS Colloquium invited speakers were Claire Postlethwaite of the University of Auckland (ANZIAM speaker), Catherine Greenhill of the University of New South Wales and Ian Frigaard of the University of British Columbia.

NZMS Awards

I will first record the awards from last year.

The NZMS Research Award winner for 2014 was Dimitri Leemans of the University of Auckland "for his striking contributions to algebraic combinatorics that combine techniques from algebra, graph theory, combinatorics and number theory for the exploration and classification of highly symmetric geometric structures".

The NZMS Early Career Award winner for 2014 was David Simpson of Massey University "for his contributions to the analysis of the effects of randomness and uncertainties in nonsmooth dynamical systems".

The 2014 Aitken Prize for the best spoken presentation by a student at the NZMS Colloquium went to Timm Treskatis of the University of Canterbury for his talk "Accelerated gradient vs. primal-dual methods in nonsmooth optimisation". Honourable mentions went to Karen McCulloch (Massey University) and Ilija Tolich (University of Otago).

The 2014 ANZIAM poster prize for the best poster by an early career researcher at the NZMS Colloquium Poster Session went to Andrea Babylon of Massey University for her poster "Modelling Leptospirosis in Livestock".

The following Fellows of the New Zealand Mathematical Society were announced in 2014: Astrid an Huef, Gaven Martin, Graham Weir and Sir Vaughan Jones.

The 2015 awards were announced at the Colloquium Dinner.

The NZMS Research Award winner for 2015 is Hinke Osinga of the University of Auckland "for pioneering work on theory and computational methods in dynamical systems and its applications in biology and engineering."

The NZMS Early Career Award winner for 2015 is Adam Day of Victoria University of Wellington "for fundamental contributions to the theory of algorithmic randomness and computability including the solution of the random covering problem."

The 2015 Aitken Prize for the best spoken presentation by a student at the NZMS Colloquium goes to Andrew Keane of the University of Auckland for his talk "Bifurcation analysis of a model for the El Niño Southern Oscillation". There were honourable mentions for Timm Treskatis (University of Canterbury) and Vee-Liem Saw (University of Otago).

The 2015 ANZIAM poster prize for the best poster by an early career researcher at the NZMS Colloquium goes to Andrus Giraldo of the University of Auckland for his poster "To flip or not to flip?". There were high commendations for Samin Aref (University of Auckland/Te Pūnaha Matatini) and Bonnie Yu (University of Auckland/Te Pūnaha Matatini).

The following new Fellows of the New Zealand Mathematical Society were announced at the 2015 NZMS Colloquium Dinner: Steven Galbraith, Mick Roberts and Charles Semple.

Honorary membership of the New Zealand Mathematical Society was awarded to David Gauld of the University of Auckland acknowledging his "outstanding and sustained contribution to the Society, the New Zealand Mathematical Community and Mathematics".

Acknowledgements

I am grateful to the team led by Rua Murray involved in the organisation of this year's NZMS Colloquium. This was a great event. It was good to be back at a Colloquium at the University of Canterbury and in Christchurch again.

There are many people who contribute to the running and life of the New Zealand Mathematical Society. I am grateful to them all. I thank Council for their efforts. Alex James steps down after six years on Council, including four years as Secretary. In particular, I thank Emily Harvey as Secretary and Bruce van Brunt as Treasurer. I wish Astrid the very best for her term as the President of the New Zealand Mathematical Society.

Winston Sweatman

LETTERS

Please send your Letters to the Editor (as usual, the editor's decision is final and excessively long ones may be abridged), requests for collaboration, etc. Anything that genuinely helps create useful discussion and interaction between members on topics related to mathematics is desirable.

History of the NZ Mathematics Colloquium

(Sent during the 2015 NZMC)

As it was noted at the opening of the NZ Mathematical Society Colloquium yesterday, this meeting (December 2015) is, I believe, the 50th such meeting.The first Colloquium was held at Victoria University of Wellington in mid-May 1966. (I have counted the joint meetings, occasionally off-shore, in Australia, embedded within a larger meeting and, in one case in 2003, this was held within the International Congress of Industrial and Applied Mathematics which was held in Sydney.)

As I was there in May 1966, attending as a second-year PhD student, I can note that it was a small meeting of about 30 attendees. There were no parallel streams, and a couple of keynote speakers. The plan was hatched largely by the good planning by then Heads of Mathematics Departments: the late Professors Jim Campbell (Wellington) and Derek Lawden (Canterbury). I remember talking on using ignition theory to estimate thermal properties of solid combustible materials using experimental data. On hearing my talk, one member of the audience, the late Professor Cecil Segedin, made a good suggestion, for which I was grateful, and which was incorporated in the procedures now used commonly in the procedures for the Calorimetry of Oxidation Reactions.

Participants came largely from the (then six) University Departments and also the Applied Mathematics Division of the Department of Scientific and Industrial Research, which was then (until 1992, when it was dismantled) housed on the VUW campus. Its undoubted success is reflected in the many wonderful developments since then and it was a firm basis for future developments. The NZ Mathematical Society came into existence later, in 1974, and the convergence into the NZMC happened a little slowly but is now complete. (I myself was privileged to be its first Secretary.) The idea of the original meeting came, I believe, from the parallel existing annual meeting of the Statistical Association of NZ, in which Jim Campbell was also heavily involved.

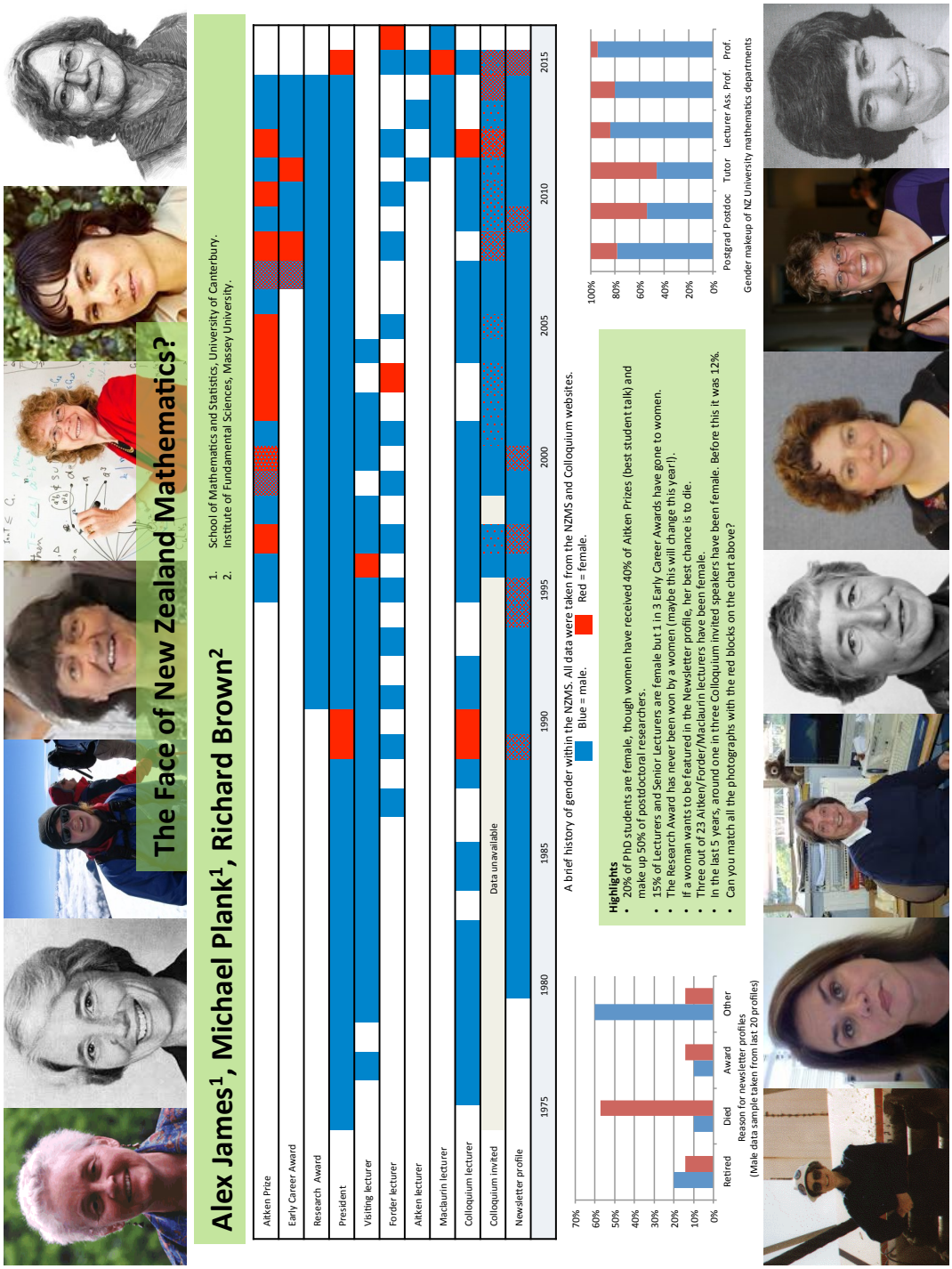
This half-century of superb progress must, I believe, be sustained so as to continue to provide a vehicle for a collaborative environment within which Mathematics and its applications can be nurtured for the greater benefit of NZ.

Graeme Wake

From the Centrefold article for Gordon Petersen in Issue 29: "Of his association with mathematical life in New Zealand Gordon looks back on the establishment of the Colloquia as a great success. He recalls making the suggestion at a Steering Committee meeting in Professor Campbell's office in Wellington and having the balance tipped in its favour by Professor Jowett's enthusiasm. The First New Zealand Mathematics Colloquium took place in Wellington the following May (1966)." — *Ed.*

Women in Mathematics in NZ

(We solicited the poster shown from Alex James after being alerted to it at the NZMC. Discuss! — *Ed.*)



INVITED ARTICLES

Piecewise-linear maps: intricate dynamics with explicit solvability

The logistic map,

$$x_{i+1} = ax_i(1-x_i)\,, \tag{0.1}$$

will be familiar to many readers. It is a one-dimensional, discrete-time dynamical system exhibiting complicated dynamics and given in many textbooks to illustrate the period-doubling route to chaos. For most values of the parameter a, some numerical prowess is required to study invariant sets of (0.1). For instance, to find the points of a period-n solution to (0.1), the equation $x_n = x_0$ leads us to a degree-2^n polynomial in x_0 that we need to solve. However, with $a = 4$, assuming we only consider $x_i \in [0,1]$, as is usual, the remarkable coordinate change $x_i = \sin^2\left(\frac{\pi y_i}{2}\right)$ converts (0.1) into the piecewise-linear map

$$y_{i+1} = \begin{cases} 2y_i\,, & 0 \le y_i \le \frac{1}{2} \\ 2(1-y_i)\,, & \frac{1}{2} \le y_i \le 1 \end{cases}\,, \tag{0.2}$$

known as the tent map. Periodic solutions of (0.2) can happily be found by solving linear equations. For example, to find a point y_0 of a period-3 solution (i.e. $y_3 = y_0$) for which $y_0 \le \frac{1}{2}$, $y_1 \le \frac{1}{2}$ and $y_2 \ge \frac{1}{2}$, we solve $y_0 = 2\,(1-(2(2y_0)))$, and obtain $y_0 = \frac{2}{9}$. The piecewise-linear nature of (0.2) allows for substantial explicit solvability such as this, yet it exhibits intricate dynamics. Indeed it is not difficult to use (0.2) to show that the logistic map with $a = 4$ is chaotic and study the nature of this chaos in detail [1].

Naturally we are interested in higher-dimensional versions of (0.2). Any piecewise-linear continuous map on $\mathbb{R}^2$ that is comprised of two pieces and satisfies certain non-degeneracy conditions, can, via an affine coordinate change, be put in the canonical form

$$\begin{bmatrix} u_{i+1} \\ v_{i+1} \end{bmatrix} = \begin{cases} \begin{bmatrix} \tau_L & 1 \\ -\delta_L & 0 \end{bmatrix} \begin{bmatrix} u_i \\ v_i \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \end{bmatrix}\,, & u_i \le 0 \\ \begin{bmatrix} \tau_R & 1 \\ -\delta_R & 0 \end{bmatrix} \begin{bmatrix} u_i \\ v_i \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \end{bmatrix}\,, & u_i \ge 0 \end{cases}\,, \tag{0.3}$$

where $\tau_L, \delta_L, \tau_R, \delta_R \in \mathbb{R}$ are parameters. Any periodic solution to (0.3), with a given itinerary relative to $u = 0$, can be found by solving a linear system of equations.

The map (0.3) was first constructed and examined in a 1992 paper by Nusse and Yorke [2] (the same Yorke who coined the term "chaos" with Li). This work was motivated by mathematical models of economics systems that are piecewise-linear due to non-negativity constraints, decisions, or optimisation [3]. More generally, piecewise-smooth maps and piecewise-smooth systems of ODEs are used to model physical systems that involve some sort of switch or abrupt event, such as vibro-impacting mechanical systems [4], circuit systems with switching elements [5], and, most recently, ecological systems involving quotas or species that switch between different habitats or food sources [6].

Despite its simplicity, (0.3) can exhibit extraordinarily complicated dynamics, and this is the subject of ongoing investigations. For example, Fig. 1 shows phase portraits of (0.3) with

$$\delta_L = 0.5\,, \qquad \tau_R = -2\,, \qquad \delta_R = 2\,, \tag{0.4}$$

and three different values of τ_L. For each value of τ_L, (0.3) has a repelling fixed point, an attracting period-3 solution, and a saddle-type period-3 solution. The stable and unstable manifolds of the saddle-type solution are shown (the stable [unstable] manifold of an invariant set Λ is the set of all points that converge to Λ as $i \to \infty$ [$i \to -\infty$]).

As with smooth maps, intersections of stable and unstable manifolds correspond to homoclinic orbits, and transverse intersections indicate the presence of topological horseshoes and chaos. For this example the manifolds develop intersections at a critical value of τ_L (shown in the middle plot). It is interesting that since the manifolds are piecewise-linear, pieces of the manifolds emanating from the period-3 solution can be computed analytically, from which it can be shown that the manifolds first intersect at a root of $128\tau_L^8 + 896\tau_L^7 + 2488\tau_L^6 + 3292\tau_L^5 + 1729\tau_L^4 - 328\tau_L^3 - 566\tau_L^2 - 45\tau_L + 34$. This is an example of the general observation that calculations which are intractable for smooth maps can be achieved exactly for analogous piecewise-linear maps.

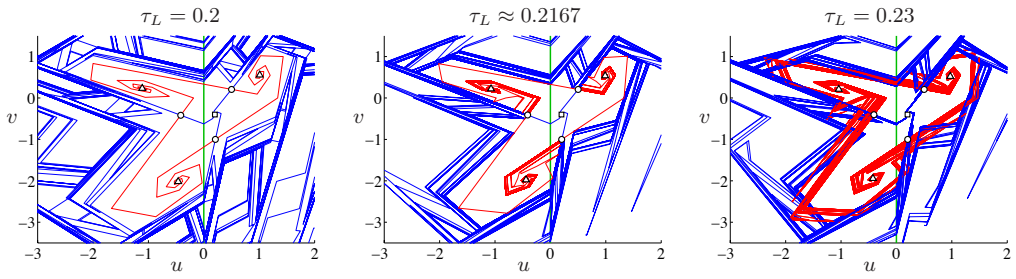


Figure 1: Phase portraits of (0.3) with (0.4) and three different values of τ_L. In each plot, the square is a repelling fixed point, the triangles indicate an attracting period-3 solution, and the circles indicate a saddle-type period-3 solution. The stable and unstable manifolds of the saddle-type period-3 solution are coloured blue and red, respectively.

Recent studies have uncovered previously unknown possibilities for the dynamics of (0.3). For instance, with $\tau_R \approx 0.5437$, specified exactly as a root of $\tau_R^3 + \tau_R^2 + \tau_R - 1$, and remaining parameter values given by

$$\tau_L = -\tau_R^2 \,, \qquad \delta_L = -1 \,, \qquad \delta_R = \frac{1}{\tau_R} \,, \tag{0.5}$$

(0.3) has an attracting invariant set that is two-dimensional (it fills a quadrilateral) [7]. Also with

$$\tau_L = -\frac{55}{117} \,, \qquad \delta_L = \frac{4}{9} \,, \qquad \tau_R = -\frac{5}{2} \,, \qquad \delta_R = \frac{3}{2} \,, \tag{0.6}$$

(0.3) has infinitely many attracting periodic solutions [8]. Since both examples concern attracting sets, the reader can readily explore these examples for themselves by iterating (0.3) with their favourite numerical software.

Piecewise-smooth systems can exhibit transitions between dynamics that are not possible for smooth systems. As illustrated here with the piecewise-linear map (0.3), piecewise-smooth systems can be simple yet exhibit complicated dynamics, and so are often highly suitable prototypical mathematical models. For a recent review of (0.3), refer to [9].

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David Simpson

Symmetric groups and polytopes

Polyhedra and their generalisation to higher dimensions, namely polytopes, have fascinated mathematicians for more than two milleniums. The five platonic solids were known to the Greeks around 500BC already. In the second half of the 20th century, Grünbaum and Danzer gave a more abstract definition of these objects as partially ordered sets satisfying some extra axioms. McMullen and Schulte have studied further those polytopes that have maximum level of symmetry, namely *abstract regular polytopes* in [1].

An *abstract polytope* is a partially ordered set $(\mathscr{P}, \leq)$ with special properties **(P1)** to **(P4)** that hold for certain solid geometric objects (known as geometric polytopes).

(P1) The polytope has a maximum element (which is usually called $\mathscr{P}$ as well), and a minimum element, which is often denoted by ϕ (like the empty set).

All other elements of the polytope are called *faces*, and they occur in 'layers'. Specifically, for some positive integer n there is a *rank* function $r\colon \mathscr{P} \to \{-1,0,1,2,\ldots,n\}$, such that $r(\phi) = -1$, $r(\mathscr{P}) = n$, and $r(x) < r(y)$ whenever $x < y$ in $\mathscr{P}$. The elements of rank k are called the k-faces of $\mathscr{P}$.

(P2) Every maximal chain in $\mathscr{P}$ is required to have length $n+2$ and therefore be of the form

$$\phi \;<\; x_0 \;<\; x_1 \;<\; \ldots \;<\; x_{n-1} \;<\; \mathscr{P}$$

where each x_k is a k-face. Every such maximal chain is called a *flag* of P.

We denote by $\mathscr{F}(\mathscr{P})$ the set of flags of $\mathscr{P}$.

To complete the definition of an abstract polytope, we require two more properties, which depend on the following concepts. We say that two flags are *adjacent* if one can be obtained from the other by replacing just one of its faces; and if x and z are elements of $\mathscr{P}$, then we call the set $[x,z] = \{y \in \mathscr{P} : x \leq y \leq z\}$ a *section* of $\mathscr{P}$.

(P3) The polytope $\mathscr{P}$ must be *strongly connected*, which means that any flag F' can be obtained from any other flag F by a sequence $(F_0, F_1, F_2, \ldots, F_m)$ of flags where $F_0 = F$ and $F_m = F'$, and the flag F_{i-1} is adjacent to the flag F_i for $1 \leq i \leq m$.

(P4) The polytope $\mathscr{P}$ must satisfy the *diamond condition*, which says that for each rank k, if x and z are elements with $x \leq z$ and $r(x) = k-1$ and $r(z) = k+1$, then there are exactly two elements of rank k in the section $[x,z]$; in other words, the section $[x,z]$ looks like a diamond, with top element z, bottom element x, and two intermediate elements y and y'.

A map $\varphi : \mathscr{P} \to \mathscr{P}$ between the element-sets of a polytope $\mathscr{P}$ is called an *automorphism* if it preserves *incidence* (i.e. $F \leq G$ in P implies $F\varphi \leq' G\varphi$ in $\mathscr{P}$). The set of all automorphisms of a polytope $\mathscr{P}$ together with the composition law forms a group called the *automorphism group* $\Gamma(\mathscr{P})$. Clearly, if $\mathscr{P}$ is finite, then $\Gamma(\mathscr{P})$ is also finite.

An *abstract regular polytope* is an abstract polytope $\mathscr{P}$ whose automorphism group $\Gamma(\mathscr{P})$ acts transitively (and hence regularly) on the flags of the polytope.

If $\mathscr{P}$ is an abstract regular polytope of rank r and F is a flag of $\mathscr{P}$, then $\Gamma(\mathscr{P})$ is generated by a distinguished set of involutions $\rho_0, \ldots, \rho_{r-1}$ such that $F\rho_i = F^i$ where F^i is the i-adjacent flag of F, that is the flag which differs from F only in its i-face. The generators satisfy the so-called *intersection property*, namely that for any subsets J, K of $\{0,\ldots,r-1\}$,

$$\langle \rho_j | j \in J \rangle \cap \langle \rho_k | k \in K \rangle = \langle \rho_j | j \in J \cap K \rangle$$

They also satisfy the *string condition*, namely that $\rho_i\rho_j = \rho_j\rho_i$ for every i, j with $|i-j| > 1$.

A pair $(G, \{\rho_0, \ldots, \rho_{n-1}\})$ where G is a group and $\{\rho_0, \ldots, \rho_{r-1}\}$ is a generating set of involutions of G satisfying the intersection condition and the string condition is called a *string C-group*. Starting from a string C-group $(G, \{\rho_0, \ldots, \rho_{r-1}\})$, there is a unique way to construct an abstract regular polytope using an algorithm first described by Jacques Tits in the 1950's [2] as shown in [1, Section 2E]. Hence, in order to classify all abstract regular polytopes having a given group of automorphism, we can use the string C-group framework. This permits right away to bound the maximum rank of an abstract regular polytope having a symmetric group S_n as automorphism group. Indeed, the intersection condition implies that the generators must form an *independent generating set*, namely that every generator is not in the subgroup generated by all the others. Julius Whiston showed in 2002 [3] that independent generating sets have size at most $n-1$ for S_n. Moreover, in 1898, Elakim H. Moore gave in [4] what is now called the *Coxeter presentation* for S_n, namely the set of transpositions $\{(i, i+1) \in S_n : i \in \{1, \ldots n-1\}\}$ that, together with S_n form a string C-group. Hence the maximal rank of an abstract regular polytope for S_n is $n-1$. With Maria Elisa Fernandes, we showed in 2011 [5] that it is possible to construct abstract regular polytopes of rank r for every $3 \leq r \leq n-1$ having S_n as automorphism group. The following table gives the number of such polytopes, up to isomorphism and duality, for S_n with $n \leq 14$.

G\r	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
S_5	4	1	0	0	0	0	0	0	0	0	0
S_6	2	4	1	0	0	0	0	0	0	0	0
S_7	35	7	1	1	0	0	0	0	0	0	0
S_8	68	36	11	1	1	0	0	0	0	0	0
S_9	129	37	7	7	1	1	0	0	0	0	0
S_{10}	413	203	52	13	7	1	1	0	0	0	0
S_{11}	1221	189	43	25	9	7	1	1	0	0	0
S_{12}	3346	940	183	75	40	9	7	1	1	0	0
S_{13}	7163	863	171	123	41	35	9	7	1	1	0
S_{14}	23126	3945	978	303	163	54	35	9	7	1	1

Part of this table, namely when $r > n/2$, showed some patterns. We also showed in [5] that when $n \geq 5$ (resp. 7), there is a unique polytope of rank $n-1$ (resp. $n-2$). Then with Fernandes and Mark Mixer, we proved in 2015 [6] that when $n \geq 9$ there are 7 polytopes of rank $n-3$ and when $n \geq 11$ there are 9 polytopes of rank $n-4$. We conjectured that for every $k \leq n/2$ there exists a number $n(k)$ such that the number of polytopes of rank $n-k$ is constant for every group S_n with $n \geq n(k)$. This conjecture is still open.

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Dimitri Leemans

MATHEMATICAL MINIATURE

The fiftieth New Zealand Mathematics Colloquium is in full swing as I begin writing this. Graeme Wake was, famously, at the first one and almost every one since. In those early days it was taken for granted that everyone in the mathematical sciences would attend each colloquium unless there was a good reason for not doing so. But all this has changed in the intervening years. The colloquia are still highly successful but there are many fine mathematicians who never take part in them, unless they are invited speakers. It is hard for me to avoid comparing things as they are now and as they were in the early days.

In the 60s a dominant figure at the colloquia was Gordon Petersen. He gave a lecture almost every year and sometimes referred back to last year as though he had been presenting a sequence over successive days. A big worry of his was that, when the NZMS came into existence, it might try to take over the running of the colloquia and spoil the one good thing that existed in New Zealand mathematics. This attitude out-lived him but is now gone; there is now a very satisfactory relationship between the Society and the Colloquium.

Another outstanding figure at the colloquia was Gloria Olive. She lived for mathematics and her enthusiasm was contagious. A particular concern of hers was that participants at the dinner should not be disadvantaged financially if they did not wish to drink wine. At the 2015 colloquium dinner I sat at a table where only a minority wanted wine but fruit juice was readily available. Gloria would have been pleased.

The NZMS Research Awards have always been presented at the annual colloquium. This year the recipient was Hinke Osinga. Hinke is one of the true stars of New Zealand Mathematics. Not only because of her research and research leadership, which are second to none, but also because of her role in the subject itself. The days of outstanding mathematicians, like Gordon and Gloria before her, who selflessly supported the colloquium year after year are not over and Hinke is a prime example of this.

A new feature on the colloquium programme is a special invited lecture to be given by an early career mathematician. In the inaugural lecture in this series was a presentation on Borel graph combinatorics by Adam Day. It was brilliantly presented and very well received.

Then there are the people whose contribution to colloquium life were there at the beginning and are still there now. These include Graeme Wake, that tireless advocate of Industrial Mathematics who is always there, always supporting others and always advocating for our subject. John Harper, polymath and Poly-Mathematician, is another proof that the colloquium has a special and essential role in NZ mathematical life. His talk this year was on the history and development of the notion of continuity. His scholarship and attention to historical detail was impeccable as was his respect for the founders of modern analysis.

I will not name the senior mathematician whom I often met and enjoyed talking to, who had a poor view of the mathematics in his adopted country. He asked rhetorically who these New Zealanders think they are. Why should anything they might do be worthy of publication?

The poster session was again a great feature of the colloquium. Winston Sweatman, in spite of his demanding and wide-ranging responsibilities, showed himself to be a fantastic role model through his own contribution to this genre. But the student entries amongst the posters were also outstanding and for some of them, the authors were never far away and it was possible to get additional information on the spot. Amongst many excellent posters I really liked the one by Bonnie Yu which presented a graphical analysis of cooperation between leading universities throughout the world. In the light of the excellent presentations and posters from young mathematicians one can only be confident that the future of New Zealand mathematics, and of the colloquium in particular, are in good hands.

In my last column I invited comments on the 12 marble problem and I was overwhelmed to get two replies, from Don Nield and Jörg Hennig. I intended to see how their interesting contributions could be combined into a single miniature item but I haven't set this up yet.

As an open-ended new problem for readers of this column, what can you do with the series

$$1-\frac{1}{4}+\frac{1}{7}-\frac{1}{10}+\cdots$$

Can you arrive at an accurate value of the sum of the series using some sort of acceleration process? Can you find a formula for the sum?

J. C. Butcher

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CYBERMATH

"Open access publishing" is a widely used term, but it is not as well understood as it ought to be. Open access refers to the removal of barriers to readers of research publications. There are many arguments for why this is important, including fairness to researchers in poorer countries, outreach to the public, and ability to reuse and data-mine papers.

The traditional subscription model for funding journals has barriers built in, the main one being restriction of access to those who pay subscriptions. Making papers free to read by anyone with an internet connection is now technically simple and has very low cost. There are some other costs involving "added value" from peer review, typesetting, etc. Commercial journal operators have not reduced prices to anywhere near reasonable production costs, and show no sign of doing so in future. Given the monopoly that each journal has on its papers, and the anticompetitive bundling practised by publishers, this is not surprising.

The most basic and uncontroversial thing mathematicians can do is to ensure that a fairly complete version of each publication appears on their personal website, or, preferably, on a standard repository such as arXiv.org. This is called "green OA", is widely permitted by commercial publishers (many of whom allow the final, post-refereeing version to be posted), and is systematically practised by surprisingly few researchers. As I have said before, this is a bare minimum ethical standard, and anyone not already conforming to it ought to change behaviour immediately. Mathematicians are considered by researchers in other fields to be fortunate because of the existence of arXiv.org.

The next level of activity is to ensure that our papers are published in genuine open access journals (usually called "Gold OA"). This is much more difficult. There is an entire industry of new predatory publishers willing to publish almost anything in exchange for payments from authors. Excluding these, we find that many well known and established commercial publishers offer "hybrid" open access, whereby an author fee makes a particular article open access, but the publisher still takes in subscription fees for the journal. This is obviously attractive to the publisher. It is considered by open access advocates to be the worst option. Beyond this, there is a smaller number of for-profit open access journals funded by author payments. In mathematics, there are almost none of these yet.

The next level of activity is to realise that we no longer need middlemen because of the Internet. There are several reputable open access electronic journals run directly by mathematicians with no author fees. The most prominent of these is Electronic Journal of Combinatorics. However, even the best of these is an "amateur" operation. Publishers do provide some extra services such as assigning DOIs. Having zero income for a journal makes it difficult to induce non-volunteers to do these tasks, and volunteers typically would rather be doing mathematics. None of the zero-fee journals in mathematics provide all the services expected from a professional journal.

Mathematicians appear to be resistant to the idea of author payments. Of course, many authors will not pay directly, but will be subsidised by their institutions. Nevertheless, there seems to be little enthusiasm for paying fees of the order of hundreds or thousands of dollars, as is common in the biomedical sciences. However, that doesn't mean that author payments should be zero, because a little money can go a long way in this area.

My experience with both amateur and professional journals convinces me that ε-author payment journals are both desirable and possible. Timothy Gowers has started a new journal called *Discrete Analysis* whose costs are low enough that they will be covered by philanthropy for several years. In humanities, the Open Library of Humanities has launched this year. Journals are published by the new publisher Ubiquity Press (a spinoff from University College London). Author fees are covered by a library consortium. This model seems to be an excellent way forward for mathematics. I have seen close up how Ubiquity works, and it leaves the traditional commercial publishers for dead.

Watch this space — I hope to have more news soon.

Mark C. Wilson

WHERE ARE THEY NOW?

I came across Rowan Killip's name while doing the citation analysis in an earlier issue, and remembered a quiet student of that name in an algebra course I taught at Auckland many years ago.

Mark Wilson (MW): Please give a brief career overview.

Rowan Killip (RK): I completed an B.Sc. (Hons) in Mathematics at the University of Auckland in 1994 and then a Masters the following year. During that period I would say I took an equal number of mathematics (pure & applied) and physics classes and indeed, for the masters I wrote two half-theses: one in mathematics with B. Pavlov and one with H. Wiseman from the physics department.

I applied to just a few places in the US for admission to the PhD program and accepted an offer from Caltech (more fully, The California Institute of Technology) here in Los Angeles. Now that I see how things work in the US, applying to so few places and so randomly chosen was a mistake, though it happened to work out okay for me.

I completed my PhD with Barry Simon at Caltech in 2000. In addition to his direct supervision, I benefited enormously from the wealth of post-docs and other visitors with which he was surrounded.

I was rather itinerant as a post-doc, spending time at the University of Pennsylvania, the Institute for Advanced Study (in Princeton, NJ), at the Institute Mittag–Leffler (in Stockholm) and at Caltech again.

I was invited to apply for an Assistant Professor position at UCLA at the beginning of my last post-doc and jumped at the opportunity. I have been there since 2003, rising through the ranks to Professor. I should note that unlike the UK or NZ systems, most faculty in the US obtain the title of (Full) Professor — Assistant and Associate are usually just stepping stones.

MW: What do you consider your career highlight in terms of research contribution? Feel free to be technical here.

RK: I rather hope the best is yet to come. Two major contributions are the following:

(i) The development with B. Simon and D. Damanik of necessary and sufficient conditions in the spectral theory of one-dimensional Schrödinger operators. The first question addressed was which measures arise as the spectral measures of Schrödinger operators with potentials $V \in L^2(\mathbb{R})$. Subsequently, we addressed the same question for analogous perturbations of an operator with periodic coefficients.

(ii) The development in a series of joint works with M. Visan and others of technology for treating scaling-critical dispersive PDE in the presence of broken symmetries (including broken scaling symmetry).

MW: What things have you done in your career that would simply not have been possible in NZ?

RK: I don't think I could have learned so much from so many people if I had stayed down-under. The internet has transformed the way math is done. As a student, when I wanted to know something, I went to the library. These days, when I come across a technical term I don't know, Google and/or Wikipedia tell me the answer in an instant and provide a wealth of lecture notes or research articles for further reading. Nevertheless, it's not the same as listening to someone talk about their mathematics.

MW: Have you kept in contact with NZ mathematics since you left? What is your overall impression of the NZ math scene?

RK: I haven't really kept in contact with mathematicians in NZ; the particular kind of maths I am doing these days isn't really represented in NZ. Mathematics has become a very broad subject and researchers in one particular direction are necessarily spread thinly across the globe.

MW: So do you have any advice for NZ math students thinking of pursuing a career in the US?

RK: Go for it! I truly believe that the US is the most cosmopolitan and vibrant place to do mathematics and that is very beneficial early in your career. Come for graduate school (i.e. a PhD) and maybe stay for a post-doc. This advice is bad news for the faculty at NZ institutions — of course, they would like to advise the good graduate students themselves. On the other hand, I think NZ mathematics benefits more by minimizing scientific in-breeding. My faculty colleagues here at UCLA are from all over the globe: Australia, China, Czech Republic, Germany, Greece, India, Israel, Japan, Korea, Romania, Russia, Switzerland,... and

even the Americans are from all over the country. It means that one has access to a plethora of different perspectives and that is invigorating.

At a more practical level, most US schools have a rigid application process for PhD studies; visit their websites. In particular, you apply to a department, not directly to a potential supervisor. It is worth putting a little time in to prepare for the GRE exam; it is the only evaluation tool that departments have that is the same for all applicants. Most students (foreign and domestic) are supported by TA (teaching assistant) duties, which pays tuition fees and provides a small stipend. TA duties are comprised of a mixture of classroom tutorials or lectures, grading, and holding office hours; they are not particularly onerous and this is a gentle introduction to the realities of academic life.

MW: Tell us about your activities other than mathematics.

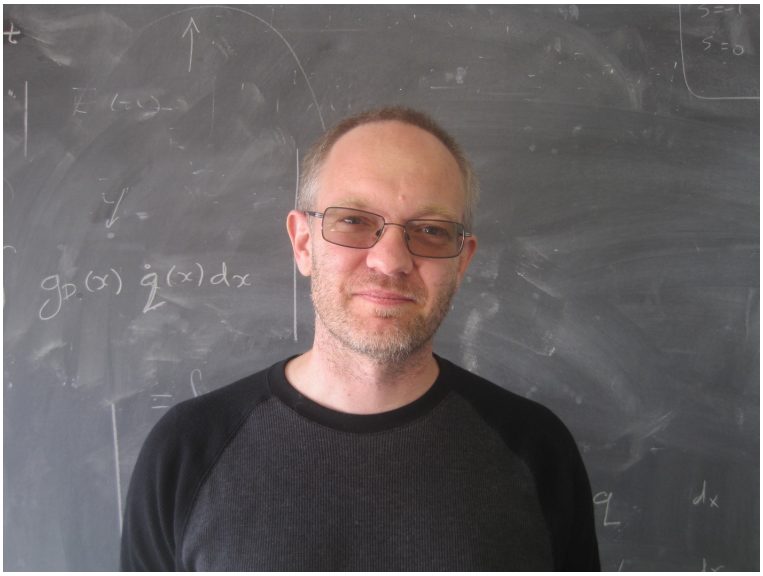
RK: Mostly parenting these days. Our two year-old son and four month-old daughter keep my wife and me very busy. Besides that, we enjoy swimming, eating well, and traveling. I also like pottering around in the garage, making small repairs and the like.

MW: What is it like working at UCLA, with the likes of T. Tao?

RK: I really like the environment in which I work. I have fond memories of the conviviality of the mathematics and physics departments at the University of Auckland; it is something we have here at UCLA, but it is actually rather rare.

On the scientific side, there are many benefits to being surrounded by the world experts on all sorts of things. While one rarely needs their in-depth knowledge of the very frontier of research, their depth of understanding equates to effortless explanations of great clarity when one does get a little bewildered about something or other. It also guarantees that the weeks are filled with a vibrant array of seminars and colloquia.

The collective reputation of my colleagues also attracts many able and ambitious graduate students, which makes teaching graduate-level courses a real joy and has given me the pleasure of advising some top-notch PhD students.



Mark C. Wilson

INTERVIEW

2015 Maclaurin Lecturer Ingrid Daubechies visits NZ

Ingrid Daubechies and Hinke Osinga in Albert Park, Auckland.

The American Mathematical Society and New Zealand Mathematical Society established the Maclaurin Lectureship in 2012 to enable the exchange of famous mathematicians giving lectures in each other's countries on alternate years. This year, Ingrid Daubechies visited New Zealand to speak at seven universities. Hosts at each university made enormous efforts to ensure Ingrid and her husband Robert Calderbank, who is also a mathematician, enjoyed their first visit to New Zealand. Florian Bayer (University of Otago) was the main coordinator of the event and deserves full credit for the smooth organisation of their visit. While Ingrid was in Auckland, I took the opportunity to interview her for the NZMS Newsletter (and Bernd Krauskopf took the accompanying photographs). At the time of the interview, Ingrid is halfway through her schedule, and Auckland is her last stop before travelling on to the South Island. She is clearly very impressed with this country and its hospitality. I ask her why she decided to take up the Maclaurin Lectureship.

"The president of the AMS asked if I was interested. Since we had never been in NZ before, this sounded very interesting, but we didn't know if we could free up the time for such a visit." Ingrid agreed in principle. Her acceptance was eagerly received and Florian Bayer started organising dates, talks, and her itinerary. Her initial plan was to visit for an entire month or so in August/September, but Ingrid's availability started to waver at both ends of this slot. "I was elected to the National Academy of Engineering, so I really wanted to be back in time for the induction" [on 4 October]. Ingrid also really wanted to go to the Burning Man event, which ran 30 August – 7 September this year. "Oh, I had been wanting to go for years, but I could never manage it, because it is always in the second week of the Fall term. However, I wasn't teaching this Fall, so I had applied for a ticket. Unfortunately, I failed to get one! And then, at the end of July, someone managed to get a ticket for me, so I just had to go." Despite the compressed time for the Maclaurin lectures, Ingrid delivered thirteen fabulous lectures! And not only this, she also managed to fit in time to enjoy the NZ country side and visit some tourist attractions. "On our first weekend, Matt Visser from U. Victoria in Wellington took us on a magnificent tour of the southern part of the North Island. For the other two weekends, we had a rental car arranged for us, which was really very nice. We loved driving around, and discovering new landscapes. Although many of those are quite unique to New Zealand, some of the pastures, sheep and cows look very much like Belgium. Even the hills felt familiar, but then the trees are really weird ones and it suddenly feels like you have been dropped in Middle Earth." Ingrid was really impressed by the way NZ embraces and takes pride in Māori culture, and how easily one encounters it, for example, through the names of villages, on tours as part of explaining Māori significance of certain sites or events and, of course, the world-famous haka at the rugby events.

Ingrid Daubechies is famous for her work on the theory and application of wavelets. I asked her how she got into it and whether she actually invented this subject area. "Oh no! Wavelets have been around for almost a century." The word itself was borrowed from seismology by a geophysical engineer called Jean Morlet who had the idea of using an amplitude envelope with oscillations as a basic pattern; to obtain higher or lower frequency templates, he simply compressed or stretched the abscissa. "There are many names for all kinds of different envelopes in seismics, which are kept fixed and filled in with faster or slower oscillations; examples are the Klauder wavelets or XYZ-wavelets." Morlet called his alternate family 'wavelets of constant shape'; later, the qualifier was dropped. He learnt how to read a (seismic) signal in terms of his new wavelets, but these ideas were not described in applied mathematics books. It was Alex Grossman from Marseille who interpreted wavelets in the correct mathematical setting and, in collaboration with Morlet, did pioneering work on wavelet analysis; ultimately, he was also instrumental in linking up wavelets with harmonic analysis, the pure mathematics discipline that did describe similar ideas.

Reception before Ingrid's colloquium "Bones, Teeth and Animation" at the University of Auckland.

As it happened, Ingrid was in Marseille at that same time, visiting Grossman, who is actually her former thesis mentor. In Brussels, Belgium, she had obtained a first degree in Physics and had then pursued a PhD in Mathematical Physics. "My PhD advisor had too many PhD students at the same time. I was farmed out to Theoretical Physics in Marseille, where I met and started working with Alex Grossman on the correspondence between classical and quantum mechanics." Ingrid first ventured into her thesis topic by reading a paper of Grossman "Parity operator and quantization of δ-functions" (*Comm. Math. Phys.* **48**, 1976). As she tried to understand this paper, she worked out a generalised version and Grossman encouraged her to write her first single-author paper "An application of hyperdifferential operators to holomorphic quantization" (*Lett. Math. Phys.* **2**, 1978). "He was very generous and did not want to be a co-author at all." Instead he helped her by reading many drafts and pointing out which parts were not clear and why. "His mentoring reinforced the value of articulation, taught to me by my father since my childhood from the principle so eloquently formulated by Boileau:

> *Ce que l'on conçoit bien s'énonce clairement,*
> *Et les mots pour le dire arrivent aisément.*
> [Nicolas Boileau, De L'Art poétique (1674)]

and I have used this same principle ever since. It is also very good for teaching: you have to find the words that make students understand your lectures. I think that the process of becoming a mathematican is to learn the discipline of challenging yourself until you are sure, without any doubt, that you have a watertight argument."

This attitude of continuously asking yourself whether you have understood the material or theory may well have been formed very early on in Ingrid's career. She was one of the first students to start studying at the *Vrije Universiteit Brussel*. This Flemish university had split from its French cousin *Université Libre de Bruxelles* only two years earlier and all its courses were in Flemish. "But of course, there were no Flemish books and only few courses already had their coursebooks translated into Flemish. Hence, for most of my courses, I had to take notes. If you did not have good notes from your lectures, you had nothing!" Needless to say, Ingrid never missed a lecture and became an incredibly good note taker.

Ingrid's thesis research laid the foundations for her understanding of physics both from the point of view of a given particle position and momentum in phase space and from the point of view of a given coherent state, which specifies the particle in terms of a Gaussian centred around a certain position and momentum. After obtaining her PhD in 1980, Ingrid spent a few postdoctoral years in the US, working on quantum mechanics. Returning to Belgium, she was intrigued by Grossman's work on signal analysis, and visited him again. Just as with particle physics, signal analysis has two points of view, namely, viewing the signal as a time series or in frequency space. With her background, Ingrid was already used to such a dual point of view and, even though the signal processing theory was all new to her, she was able to learn it very quickly.

The collaboration with Grossman focussed on wavelet discretisations. The idea was to obtain an algorithm like the Fast Fourier Transform, but for wavelets. One problem is that the wavelet families are not necessarily orthogonal or even bases. With Grossman and the distinguished harmonic analyst Yves Meyer, she published the paper "Painless nonorthogonal expansions" (*J. Math. Phys.* **27**, 1986), which introduces the notion of 'quasiorthogonal' expansions obtained from a collection of elements that are not linearly independent.

Ingrid discusses her book *Ten Lectures on Wavelets* (SIAM, 1992).

"Everyone believed at the time that it was not possible to obtain an orthogonal basis." Setting out to prove this (unstated) believe, Meyer, soon afterwards, provided the first construction of an orthonormal wavelets basis with excellent smoothness and localisation properties. Next, joint work of Meyer and Stéphane Mallat led to the multiresolution analysis framework that was the natural approximation theory setting underlying the construction of wavelet bases, and which also gave a natural algorithm to find the wavelet decomposition of a function. Yet, in order to put them into practice, the filters stemming from the theory had to be truncated. This was not at all satisfying for Ingrid. She wanted a 'clean' algorithm. To obtain it, she turned the paradigm upside-down. She started from the algorithm, with finite, untruncated filters, and tried to recover the rest of the framework. And it worked! "I believe that good algorithms rely on a good mathematical idea." Here, we had a situation where the algorithm was formulated first, while the underlying mathematical structure was lacking. The uniqueness of the situation is perhaps best highlighted by the fact that for a long time wavelets were not listed in the *Handbook of Special Functions* by CRC Press. "These special functions didn't have analytic expressions; they are not solutions of some equation, but just an algorithmic construction." Ingrid's contributions to wavelet theory are born from taking both mathematics and the algorithm seriously at a time when nobody considered algorithms as a field in mathematics. Mathematically and otherwise, Ingrid is interested in all aspects: "When I eat lobster, I eat absolutely everything, including the meat in those little legs, so that I get a taste of the whole thing."

Ingrid's ground-breaking solution was published in the paper "Orthonormal bases of compactly supported wavelets" (*Comm. Pure Appl. Math.* **41**, 1988). By that time, she worked at AT&T Bell Labs. "Robert and I got married in Brussels in 1987 and we both applied for jobs in the US. I applied to Bell Labs, where he worked already, and we applied together elsewhere." Ingrid held a permanent position at the *Vrije Universiteit Brussel*, but she was given leave without pay to help solve her two-body problem. She got a job at Bell Labs; later, she took a six-month leave to visit the University of Michigan, Ann Arbor, and also worked 80% at Rutgers and 20% at Bell Labs. Having resigned in the meantime from her position in Belgium, she took up a Professorship at the University of Princeton in 1994. Since 2010, she is James B. Duke Professor of Mathematics and Professor of Electrical and Computer Engineering at Duke University.

Hinke Osinga

PROFILE

Local correspondents

The Profile (formerly Centrefold) feature has appeared in most issues of this Newsletter. Some subjects have been chosen for their mathematical achievements, others for their service to the community. Every article so far has dealt with a single person. This issue, I will dedicate the feature to many people without whom this publication would not have been able to function properly. They are the local correspondents.

Stephen Joe has produced clear and concise reports from Waikato for 20 years (!) and is handing over to Kevin Broughan, who was his predecessor as local correspondent (!!). Jörg Hennig has been a model of punctuality and nicely produced LaTeX in reporting from Otago. Peter Donelan has joined us from this issue, producing some long-needed input from Victoria. Günter Steinke has reliably sent in news from Canterbury (and has exceptional taste in clothing). Alona Ben-Tal reports from ANZIAM and this issue has also dealt with Massey-Albany. Wenjun Zhang has recently started reporting from AUT. There are a few other current correspondents who didn't send anything for this issue.

The champion correspondent is of course Garry Tee, who has sent reports from Auckland since the Newsletter was founded over 40 years ago, missing only about 7 issues in that time (!!!). His reports are comprehensive (sometimes too much so) and always on time.

Many others have fulfilled the role of local correspondent over the years (space and lack of knowledge prevent me from listing them, but this article is also dedicated to them). They will surely tell you that producing such a report is not trivial. The apathy of most colleagues, and the sometimes excessive self-promotion of others, must be balanced. I have tried to reduce the basic listing of CV items in favour of more personal information. After all, the aim is to create a community of mathematically-minded people. Current political trends make this needed as much as ever, if not more so.

Left to right, top to bottom: Stephen Joe, Jörg Hennig, Garry Tee, Peter Donelan, Günter Steinke, Alona Ben-Tal, Richard Brown, Wenjun Zhang.

Mark C. Wilson

LOCAL NEWS

ANZIAM

The NZ branch of ANZIAM administers the John Butcher Prize in Numerical Analysis which has been established to recognise 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 Potsdam, Germany to Mr. David Hipp from Karlsruhe Institute of Technology, Germany. He received a prize of 500 Euros. John Butcher presented the prize to Mr. Hipp on behalf of ANZIAM.

The NZ branch of ANZIAM currently has around 90 members, of which 28 are students. The branch sponsored this year the New Zealand Mathematics and Statistics Post-Graduate Conference, the ANZIAM speaker at the New Zealand Mathematical Society Colloquium, the Manawatu–Wellington Applied Math Day and the Maths in Industry NZ study group. The branch also awarded travel grants to four students who attended the Mathematics in Industry NZ workshop. This year, for the first time, the branch also awarded a caregiver grant-in-aid to assist with caregiving costs associated with attending a conference (in this case the NZ Maths & Stats Post-graduate Conference). We will be looking at making this a regular form of support offered by the branch, alongside the current funding for workshops and student travel.

More information on ANZIAM and the NZ branch can be found at http://www.anziam.org.au.

Alona Ben-Tal

AUCKLAND UNIVERSITY OF TECHNOLOGY

SCHOOL OF COMPUTING AND MATHEMATICAL SCIENCES

Events

Jiling Cao was the co-chair organiser of the 1st Pan Pacific International Conference on Topology an Applications, held at Minnan Normal University in Zhangzhou on 25–30 November. This inaugural conference, having 9 parallel sessions, attracted over 270 participants and over 180 speakers. Jiling will also be one of the guest editors for the conference proceedings, which will be published as a special issue of the journal "Topology and its Applications".

Sergiy Klymchuk was Convenor of the Australasian Symposium on Using Pen-Enabled Tablets in Teaching STEM Subjects held at AUT on 26–27 November. The Symposium was organised by AUT's STEM Tertiary Education Centre (STEM-TEC). Around 60 participants from Australia, USA and New Zealand attended the Symposium. It was sponsored by Microsoft New Zealand and STEM-TEC. The keynote speaker was Associate Professor Birgit Loch from Swinburne University, Australia.

On 7–8 December, the Mathematical Science Research Group (MSRG) is organising the 2015 AUT Mathematical Sciences Symposium. This is a joint effort of *Jiling Cao* and *Jeffrey Hunter*, with the assistance of Kate Lee, Sarah Marshall, Katharina Parry and Wenjun Zhang. The Symposium focuses mainly on some areas in Applied Mathematics and Analytics/Statistics. The main purpose of this event is to develop and promote opportunities for AUT academic staff working on these areas to collaborate with colleagues from other universities.

Travel and Conference Participation

Dr *Wenjun Zhang* attended the 17th International Conference on Chaos, Control, Modelling and Simulation, at Narden, The Netherlands in August and presented a talk "Chaotic behaviour in monetary systems: comparison among different types of Taylor rule".

In October Prof. *Jeffrey Hunter* visited the Institute of Advanced Analytics, North Carolina State University. NCSU was the first university in the US to deliver a Master of Science in Analytics degree. The new AUT degree, Master of Analytics was modelled on the NCSU programme in respect to content but not the 10 month intensive delivery mode offered in N.C. Prof. Hunter met with Prof. Michael Rappa, Founding Director, and Kathy Green, Associate Director. Discussions included the operation of both programmes and the opportunity for a full scholarship for a future AUT student to be accommodated within the NCSU programme.

Prof. Hunter also visited the Department of Statistics and Operations Research at the University of North Carolina at Chapel Hill, where he obtained his PhD degree in Statistics. He was also an invited speaker in a featured mini-symposium on "Numerical Methods for Markov Chains and Stochastic Models" at the SIAM (Society for Industrial and Applied Mathematics) Conference on Applied Linear Algebra held at Atlanta, Georgia over the period October 26–30.

In December Dr *Hyuck Chung* travelled to Adelaide to attend a conference on Australasian waves sciences (KOZWAVES) as one of the organisers. The School of Eng. Comp. & Math Sciences is one of the primary sponsors of the conference.

Dr *Kate Lee* gave a talk at the 8th International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics 2015) in London, UK, 12–14 December 2015.

Wenjun Zhang

UNIVERSITY OF AUCKLAND

DEPARTMENT OF MATHEMATICS

The *John Butcher* Prize in Numerical Analysis is administered by the NZ branch of ANZIAM. It has been established to recognise John's distinguished career in numerical analysis, and in particular in the numerical solution of ordinary differential equations. In keeping with John's consistent encouragement of students, the prize is for the best student talk at a SciCADE meeting, considering both the academic merit of the content and the presentation itself. The 2015 winner has been announced in Potsdam, Germany: it is David Hipp from the Karlsruhe Institute of Technology. John has been afforded a singular honour: the 14th International Conference of Numerical Analysis and Applied Mathematics, a major international annual conference which will be held in Rhodes in September 2016, will, as its principal focus, honour the many significant contributions by John during his career to both of these fields. Three of the invited speakers are winners of the Dahlquist Prize administered by SIAM, for outstanding work by someone aged 45 or less. For details of this major event, see http://icnaam.org. John is nearing the completion of the third edition of his highly successful book "Numerical Methods For Ordinary Differential Equations", and it is expected that this will be published during 2016. Congratulations to John on these recognitions and achievements.

Marston Conder's 60th birthday was celebrated on September 10 by a series of lectures given in his honour: Gaven Martin (Massey, Albany), "Tessellations and Symmetries of Spaces"; Charles Leedham-Green (Queen Mary, University of London), "The problem with SL2"; Klavdija Kutnar (Primorska University), "Cubic symmetric graphs via odd automorphisms"; and Martin Liebeck (Imperial College), "Some zeta functions associated with finite groups". Marston has been appointed as one of the three moderators for the next quality evaluation round of the PBRF (in 2018). He greatly appreciated the events organised by the Department to help celebrate his 60th birthday in September, and he and Jenny are delighted about their son Matthew winning a Woolf–Fisher Scholarship to do his PhD in Cambridge. Their elder son Jonathan is doing a PhD in algebraic geometry, at UC San Diego. Marston has travelled a bit less this year, but still attended 8 conferences overseas. He has published 8 papers so far this year (a record for Marston). He is looking forward to the "symmetries" conference in Queenstown in February 2016 (being organised by Dimitri Leemans), and a large number of visitors at around that time.

Steven Galbraith gave a Plenary Lecture at ECC 2015, held at Bordeaux on September 28–30; and he organised the Asiacrypt 2015 conference at Auckland, from November 29 to December 3.

Rod Gover was a keynote speaker at the Fourth Annual ANZAMP Meeting, at Newcastle University on December 9–11.

Sina Greenwood has received a Long-Service Award from the Faculty of Science, in recognition of her work and support for Tuakana. That programme was established 25 years ago, to provide support for Maori and Pacific students of science. She has been on sabbatical leave this year.

Vaughan Jones gave a series of lectures in our Department on December 11–14, about The Thomson groups F and T. Those groups are now popular among geometric group theorists.

Bernd Krauskopf has received (with others in the Dodd–Walls CoRE) a Tandem Workshop grant from the Max Planck Institute for the Physics of Complex Systems (MPIPCS) in Dresden. The Tandem Workshops *Pattern Dynamics in Nonlinear Optical Cavities*, to be held in Germany and in New Zealand, will bring together leading experimentalists, theoretical physicists and applied mathematicians to foster an improved understanding of fundamental processes and phenomena in lasers and more general optical cavities. This in turn is expected to lead to smaller, faster and more energy-efficient optical devices that are capable of generating signals, storing them and even processing them. Professor Dr Kathy Lüdge of the Technical University of Berlin has been awarded a Feodor Lynen Research Stipend from the Humboldt Foundation to visit hosts Bernd Krauskopf and John Harvey (Physics) for 11 months from October 2016.

Hinke Osinga used a Seelye Fellowship to bring Prof. Chris Budd (University of Bath) here during August and September. He gave several lectures, including the successful public lecture "Climate Change: does it all add up?". Prior to the public lecture, he was interviewed live on Radio NZ for the programme Nine to Noon. His interview "From climate change to card tricks, Maths has the answers!" lasted almost 20 minutes. Recordings of both can be found online: http://bit.ly/1luubyG for the interview, and http://www.math.auckland.ac.nz/Lectures/Chris-Budd for the public lecture.

Arkadii Slinko's book "Algebra for Applications" has been published, as part of the Springer Undergraduate Mathematics series. The book originated from his lecture notes for MATHS 328, Algebra and Applications.

James Sneyd has received (with *Vivian Kirk*) a Marsden Grant of $550,000 for research on "Surprisingly slow dynamics in calcium models: where are the slow time scales?".

Wendy Stratton has retired after 20 years as Senior Tutor, during which period she made many lasting contributions to the Department.

Tom ter Elst has received (with *Jari Kaipio*) a Marsden Grant of $505,000, for research on "Analysis of the Dirichlet–to–Neumann map on domains with nonsmooth and stochastic boundaries".

The Mathematics Education Unit has appointed Dr *Igor Kontorovich* as Lecturer (starting in February 2016) and Dr *Jean-François Maheux* as Senior Lecturer (starting in June 2016). Igor does research on mathematical problem posing and problem solving, conceptual knowledge and creativity; Jean-François does research on the many forms of mathematical activity at different periods and in different places, including primary and secondary classrooms. And the MEU has appointed *Alan Delos Santos* (from Papatoetoe High School) to a yearlong Teaching Fellowship for 2016.

Prof. Ingrid Daubechies from Duke University visited our Department as the AMS-NZMS Maclaurin Lecturer. She gave a public lecture on September 21 and a colloquium (on Teeth) on September 23, and then she was interviewed on National Radio.

Prof. Jiawang Nie, from the University of California at San Diego, is the recipient of this year's "Kalman Visiting Fellowship" (2015). This Fellowship is funded by the Margaret and John Kalman Charitable Trust, and it supports generously a visit by a "rising star" in mathematical sciences to the University of Auckland. Jianwang will be here in 2016, hosted by Igor Klep.

Gemma Mason arrived in July as a Post–Doctoral Fellow, working with Bernd Krauskopf and Hinke Osinga.

Garry J. Tee

UNIVERSITY OF WAIKATO

DEPARTMENT OF MATHEMATICS

We congratulate *Ernie Kalnins* on being the 2015 recipient of the University of Waikato biennial Lifetime Achievement Research Excellence Award. This well-deserved award recognises Ernie's research achievements over a 40 year period. The award will be presented at a Staff Awards Presentation ceremony in early December.

After exactly 20 years as separate departments, the current Department of Mathematics and the Department of Statistics will be merged back together. So from 2016, there will be a Department of Mathematics and Statistics. In the short term, *Nick Cavenagh*, the current Chairperson of the Department of Mathematics, will become the Chairperson of the combined department. *Lyn Hunt*, current Chairperson of the Department of Statistics becomes the Convenor of Statistics. By early next year, the Statistics staff currently not on the third floor of G Block will shift to the third floor. This means that all the staff (except for Stephen Joe) in the combined department will be on the same floor.

From the next issue of the Newsletter, *Kevin Broughan* will be taking over as the local correspondent. Kevin was the local correspondent until the April 1996 issue of the Newsletter, after which Stephen took over. One could almost make the argument that Stephen has been the correspondent for the Department of Mathematics while Kevin is the correspondent for the Department of Mathematics and Statistics.

Graduate students in both mathematics and statistics were involved in organising the successful 2015 New Zealand Mathematics and Statistics Postgraduate Conference. This is the very first time that University of Waikato students have organised this conference which was held in November in Taupo.

A job offer for a tutor in mathematics is expected to be made before the end of the year. This position is fixed-term for two years.

The University of Waikato is embarking on significant changes to its curriculum as well as the structure of its undergraduate degrees. Currently, undergraduate papers (courses) are worth 15 points at 100 level, 10 or 20 points at 200 level, and 20 points at 300 level. One of the consequences of the changes to degree structures is that all undergraduate papers will be worth 15 points. So there's much discussion and debate on how the Mathematics offerings at undergraduate level are to be updated and, at the same time, ensure that the servicing role of mathematics for other subjects such as Engineering is met. There is a concern that the changes that other faculties wish to make to their degrees may have a negative effect on student numbers in mathematics and statistics.

With a new Vice-Chancellor, other changes are also happening at the university. The change with arguably the most direct financial impact on staff is the introduction of paid parking from February next year.

Stephen Joe

MASSEY UNIVERSITY

INSTITUTE OF FUNDAMENTAL SCIENCES

We would like to congratulate *Luke Fullard*, who has been awarded a prestigious two year Rutherford Foundation Award Postdoctoral Fellowship for "Mathematical modelling of dense granular flow phenomena in simple geometries with application to industry, geophysics, and aviation safety".

We would also like to congratulate *David* and *Shannon Simpson* on the birth of their son Hugo.

Richard Brown

INSTITUTE FOR NATURAL AND MATHEMATICAL SCIENCES

Alexander (Sasha) Melnikov, who joined our institute as a lecturer in mathematics at the beginning of 2015, became a father for the second time in late August. Congratulations, Sasha!

Emily Harvey, who has been a postdoctoral fellow in our institute since August 2013, will be leaving in mid-December 2015 to take up a position at Market Economics in Auckland. Emily worked with Alona Ben-Tal on modelling airflow in the respiratory system of birds, and also contributed to teaching at Massey University. Emily has served as the secretary of the NZ mathematical Society in the past two years and will continue in this role when she changes jobs. We wish Emily the very best in her future endeavour.

We are very pleased that *Frederick Lam* has accepted a permanent senior tutor position at the end of June after working eight years for the institute on fixed term contracts.

Shaun Cooper and *Alona Ben-Tal* were both on Sabbatical in the second semester. Shaun is currently based at the University of Newcastle in Australia and will be away in the first half of 2016 as well. Alona spent part of her Sabbatical at Fisher and Paykel Healthcare and part of it travelling in Europe and the USA. In Europe, Alona visited Bristol University where she gave two seminars, one to the Department of Engineering Mathematics and another to the School of Physiology and Pharmacology. She then attended and presented a talk at SciCADE 2015 in Potsdam, Germany. In the USA she was an invited visitor at the University of South Florida, St. Petersburg where she also gave a talk to the Biology Department & Math/Stat Program.

Graeme Wake was the keynote invited speaker at a Knowledge-Transfer-Network (UK)-organised meeting/workshop on Mathematics in Agriculture held at Harper Adams University, in Shropshire, UK, in April. While in the UK he also delivered a seminar in the Industrial Mathematics Series in OCIAM, Oxford University.

Graeme Wake and recently completed PhD student Dr *Ali Asher Zaidi* attended the quadrennial International Congress of Industrial and Applied Mathematics Congress in the centre of Beijing, China in August. Both presented contributed papers and Graeme co-chaired a set of nine mini-symposia on Industrial mathematics. Ali Zaidi has returned to Pakistan and will take up his new position as Assistant Professor in the School of Sciences & Engineering, Lahore University of Management Sciences, in January.

At the invitation of the National Institute for Mathematical Sciences (South Korea), Graeme Wake travelled to Seoul in October to be a lead speaker at their "Global Forum for Industrial Mathematics", which signalled the launch of this initiative for all of South Korea. This initiative is similar to that in New Zealand, but there the drive is coming from the South Korean government, which has allocated $US2.5 million for this start-up. There are 21 satellite-linked centres in this fantastic initiative across the country. These above two events led to articles in SIAM NEWS and SCIENCE (the latter is published by the American Association for the Advancement of Science).

Several of us (*Annalisa Conversano, Frederick Lam, Shaun Cooper, Winston Sweatman, Victor Yeh* and *Alona Ben-Tal*) have been nominated for the Albany Student Association Lecturer of the year award. Alona received an Advocacy Accolade entitled "The Alexander Aitken Award" for "accelerating the convergence between learning and mathematical understanding; enabling struggling students to experience a numeric epiphany which keeps them on point and determines success".

Alona Ben-Tal

VICTORIA UNIVERSITY OF WELLINGTON

SCHOOL OF MATHEMATICS AND STATISTICS

It is several issues since the record of events at Victoria has appeared under Local News and it would be tiresome to rehearse everything that has been lost to history as a result. In any case, PhD completions, grantee reports and conference summaries indicate that mathematical life is still thriving here. Eagle-eyed readers with an elephant's memory may have noticed that the School's name has shortened following the closure of the Operations Research major last year. The loss of the major does not signal the disappearance of the subject from the curriculum and we retain undergraduate and postgraduate courses in OR. We hope also that these courses, combined with others in statistics, mathematics and computer science will form the basis of new computational and data science specialisations in due course.

There have been quite a few staffing changes over the past year. Sadly, *Mark Johnston* left us at the beginning of the year to return with his family to the UK and a job at the University of Worcester. *Peter Smith* returned to Victoria, after a long stint in Electrical and Computer Engineering at Canterbury, to take up a chair in statistics, working especially on communication statistics and strengthening our ties further with the engineering programme. Pete has been teaching (among other things) in our new ENGR 123 course, one of three first-year engineering mathematics courses. It is great to have Pete's ever cheerful presence back. While *Geoff Whittle* is on his James

Cook Fellowship, undertaking the arduous task of writing up with colleagues Bert Gerards and James Oxley the mammoth proof of Rota's conjecture, we are delighted to have been rejoined by *Dan Turetsky*, a former post-doc of *Rod Downey*'s, on a 2-year lectureship. Dan works closely with Rod and *Noam Greenberg* and adds further lustre to the logic and computation group here. A constellation of matroid theorists, including Bert and James, will be at Victoria during December for the conference to mark Geoff Whittle's 65th birthday (http://sms.victoria.ac.nz/Events/GeoffWhittleConference/).

Victoria launched its actuarial science major this year – a joint initiative between this school and Economics & Finance. *Colin O'Hare* has been teaching the capstone course and it has been great to have his expertise in such programmes that he has developed or contributed to in the UK and Australia. Mid-year we were joined by *Budhi Surya* as lecturer in statistics. Budhi has come from Bandung Institute of technology, Indonesia, his PhD from Utrecht, and he works in financial economics and Levy processes. Very recently we have been joined by *Laura Dumitrescu* who has taken up a lectureship in statistics. Laura had a short stint in Bruz, France, after post-doctoral and teaching positions in Canada and the US before moving to Wellington. Laura's main area of research is small area estimation. Finally, we also said farewell to our statistical consultant *Dalice Sim*. We are very pleased that recent PhD graduate *Lisa Woods* was able to take her place and has been doing a great job for staff and postgrads around the university. The consultancy is currently undergoing a review of its scope. Former consultant *Colleen Kelly* returned for a couple of months and made an outstanding contribution to the statistical consultancy course, which is part of the new Master of Applied Statistics programme.

We have been fortunate to have some great post-doctoral fellows during the year. Currently, *Linda Brown Westrick* is working with Noam Greenberg. Linda was awarded her PhD at Berkeley before taking up a post-doc at the University of Connecticut. Her research connects computability and effective set theory with problems in analysis and dynamical systems. *Ana Alonso-Serrano* has had a post-doc with *Matt Visser* working on quantum cosmology and she will be here till the end of the year. *Daniel Fernandez* has also had a post-doc with *Richard Arnold* and *Shirley Pledger*, working on cluster analysis for ordinal data. *Sarah Howell* has been a superb teaching fellow the past six months, revitalising our first year statistics service course, but sadly will be moving on to Te Kura, the Correspondence School, in 2016. Our loss is their gain.

The school office underwent a change of personnel earlier at the beginning of the year and we were joined by *Patricia Huambachano*, *Simonette Blanco* and *Rebecca Burke* who have brought more multicultural life and colour to the school and are now invaluable parts of the school's functioning – except that Rebecca is now on maternity leave and has been temporarily replaced by the equally talented *Ani Eparaima*. The school currently has staff from 21 countries on 5 continents!

Several people have had research and study leave this year. *BD Kim* spent the first half of the year at Yonsei University in Seoul. He and his wife Minsook returned in September with their new baby, Sa Rang. *Mark McGuinness* is spending the greater part of the year at the University of Limerick. Mark reports: "There was a Study Group here in June, that I was a Moderater for, and I had a follow-up report-back meeting in November with the alumina company that brought a problem on two-phase pipe flow to that Study Group (http://www.macsi.ul.ie/esgi110/). I gave three talks at the ICIAM meeting in Beijing, China in August, one on Mathematics in Industry Study Groups in Australia and NZ, and two on volcanology modelling problems. I was a plenary speaker at the KAIST Industrial Mathematics Initiative held in Taejeon, South Korea in November, where I spoke about success stories in Study Groups around the world (http://mathsci.kaist.ac.kr/KAIST-IMI2015). I'm looking forward to co-directing the Mathematics in Industry New Zealand study group to be held at Victoria University of Wellington, 4–8 July 2016." Mark clearly likes to be busy! Finally *Hung Pham* is on RSL the second half of this year. He was in Canada for a while with a research colleague and also attending some conferences on Banach algebras but is currently pursuing several interesting research problems back in Wellington.

The 5th Wellington Workshop in Probability and Mathematical Statistics was, as ever, enjoyable and successful, bringing together people from around NZ and overseas. Then, on the heels of the Mathematics Colloquium, we have the annual Teacher Symposium bringing together secondary and tertiary mathematics educators. The theme this year is "Seeing their world?", looking at the experience of students as they transition from school to university.

We were delighted to hear that *Noam Greenberg* has been promoted to Professor as of 1 January. *Richard Arnold* and *Ivy Liu* in the statistics group were both promoted to Associate Professor, while *Dillon Mayhew* and *Adam Day* both received promotions and *Rod Downey*, *Geoff Whittle* and *Matt Visser* all received professorial promotions.

In contrast, it was very sad to hear news of the death of *Ross Renner* in September. Ross was a mathematician and statistician at Victoria over many years and a former head of school. An obituary appears elsewhere in this issue.

Peter Donelan

UNIVERSITY OF CANTERBURY

SCHOOL OF MATHEMATICS AND STATISTICS

Congratulations to *Elena Moltchanova, Rua Murray, Mike Plank* and *Cark Scarrott* on their promotions to Associate Professor, and to *Jeanette McLeod*, who has been promoted to Senior Lecturer.

Congratulations to *Rick Beatson* who will receive the University of Canterbury's prestigious Innovation Medal this year for his work with Applied Research Associates New Zealand (ARANZ) Geo and ARANZ Medical – companies which won both their categories at the Champion Canterbury Awards recently. The Innovation Medal is awarded annually by UC for excellence in transforming knowledge and ideas so that they are adopted by the wider community in ways that contribute beneficial value. It is the University's highest recognition of an outstanding innovation and is of similar prestige and standing to the UC Research and Teaching Medals.

Rick's work is based on the development of new theoretical mathematics concerning Radial Basis Functions (RBFs) in collaboration with various international researchers, graduate students and eventually engineers at ARANZ who adopted his methods, strengthened them and applied them to problems in scanning for the manufacture of prosthetic devices and to software that makes substantial improvements in the mining exploration industry.

In September we farewelled *Patrick W. Saart* who took up a position at the Newcastle University, UK. The new position will mean Patrick can be in the same country (although not the same town) as his wife Kim. He says, that after more than 20 years in Christchurch, it wasn't always his choice to leave. However, he is excited with the new challenge awaiting him in the UK and also delighted to at least be able to be again within the same time zone as Kim.

Congratulations to *Hannes Diener*, his wife Sarah and daughter Ella on the arrival of a new family member, Oliver Patrick, who was born in November, one day before Ella's third birthday.

Earlier this year, over the course of 6 months, *Clemency Montelle* was an invited researcher as part of a team of a dozen international experts to participate in an intensive multi-month workshop as part of the SAW project (Mathematical Sciences in the Ancient World). This was funded by the European Research Council Advanced Research Grant and hosted by Université de Paris-VII Diderot. In addition to full-day seminars, small working groups, and visits to manuscript libraries and instrument repositories, Clemency participated in several international conferences, including one dedicated to Mathematical Practices in relation to the Astral Sciences. She also co-organised with European colleagues a workshop on Analysing and Editing Numerical Tables from Ancient Astral Sciences, at the Observatoire de Paris. It was a great privilege for Clemency to be invited to be a guest speaker at one of the Séances of the L'Académie des Sciences along with L'Académie des Inscriptions et Belles-Lettres in the Grande Salle. She delivered a seminar as part of their celebrations for the Year of the Light (L'Année de la Lumière), naturally in French!

Raaz Sainudiin has been offered an invited Professorship (November–December 2016) in Paris, France. This is supported by a Research Chair in Mathematical Models of Biodiversity held by Veolia Environnement, French National Museum of Natural History, Paris and Centre for Mathematics and its Applications, Ecole Polytechnique, Palaiseau, France. During this time Raaz will work on combinatorial stochastic processes that algebraically encode parametric families of animal behaviours, including monogamy and patrilocality, into recombining population pedigree models that were completed with support from the same Research Chair in 2013.

In September the School welcomed Erskine Fellow Jon Pitchford from the York Centre for Complex Systems Analysis at York University, UK. Jon is a familiar face in School having visited us a few times before. His field of special interest is Mathematical Ecology and he has been teaching Fourier Systems and Laplace Transforms in MATH202, and Branching Processes and Poisson Processes in MATH407. He also was involved with postgraduate supervision and our seminar series. Jon was hosted by *Alex James*.

Günter Steinke

UNIVERSITY OF OTAGO

DEPARTMENT OF MATHEMATICS AND STATISTICS

Phil Wilcox has taken up his position as Senior Lecturer in Quantitative Genetics in August and was warmly welcomed with a traditional Mihi Whakatau (welcome ceremony). Phil is a molecular geneticist with experience in applied genomics and statistical genetics, and his PhD was in mapping disease resistance genes in forest trees. Before joining the Department, Phil was senior scientist at the NZ Crown Research Institute Scion. Welcome, Phil!

We bid farewell to *Romain Garby*, who has been an Assistant Research Fellow at the Department for six months. After a well-deserved holiday in his home

country, France, Romain started a position as an engineer at Fisher & Paykel in Dunedin. All the best for your future, Romain!

This year's Maclaurin Lecturer *Ingrid Daubechies* (Duke University, USA) visited the Department in September. Ingrid, who is most famous for her pioneering work on wavelets, gave a very interesting public lecture entitled "Surfing with wavelets", and a seminar on "Sparsity in data analysis and computation." The Maclaurin Lectureship is a reciprocal exchange between the NZMS and the American Mathematical Society, in which an NZ and a US-based mathematician tour each other's countries on alternate years.

Congratulations to *Iain Raeburn*, *Astrid an Huef*, *Lisa Clark*, and to *Tilman Davies* for being awarded Marsden grants. Iain, Astrid and Lisa's project is "Small higher-rank graphs, the structure of their operator algebras, and implications for the equilibrium states of the resulting operator-algebraic dynamical systems", whereas Tilman will investigate "Smoothing and inference for point process data with applications to epidemiology".

The Department's General Relativity group, together with the Centre for Science Communication and the Otago Museum, celebrate the 100th anniversary of Albert Einstein's theory of general relativity with a free interactive exhibition at the Otago Museum. The general public is invited to experience curved spaces, black holes, gravitational lensing, relativistic bike rides and many other things until mid-January.

David Fletcher will leave the Department in April 2016 to take up a Chair in Statistics at the University of Kent, where he will lead the Statistical Ecology Group.

Rebecca Green and *Sooran Kang* have left the Department. Rebecca was a fixed-term Statistics lecturer. She is going back to Massey after 10 months at Otago. Sooran, a postdoctoral fellow working with *Astrid an Huef* and *Iain Raeburn* on their Marsden project, was here for three years. She is taking up an appointment as Ulam Visiting Professor at the Department of Mathematics in the University of Colorado, Boulder, USA. Best wishes to Rebecca and Sooran.

Visitors

The department has hosted several visitors during the past couple of months.

Petru Cioica-Licht (Phillips University Marburg, Germany) was here for five weeks to work with *Misi Kovács* and *Boris Baeumer* on regularity properties of stochastic Volterra equations with Gaussian noise.

Erika Hausenblas (University of Leoben, Austria) visited for two months. She was working with *Misi Kovács* on numerics for stochastic Volterra equations with Levy noise.

Jiancang Zhuang (Institute of Statistical Mathematics, Tokyo) visited the Department for three weeks to work with *Ting Wang* on the Marsden Fast-start project "Developing Inversion Methods for Non-stationary Thinning of Point Processes".

Further visitors are Mark Kayll (University of Montana, USA), who is here until mid-next year to work with *Robert "Tank" Aldred*, Shlomo Moran (Technion Haifa, Israel), hosted by *David Bryant*, and Alan Hastings (University of California, USA), who worked with *Boris Baeumer*.

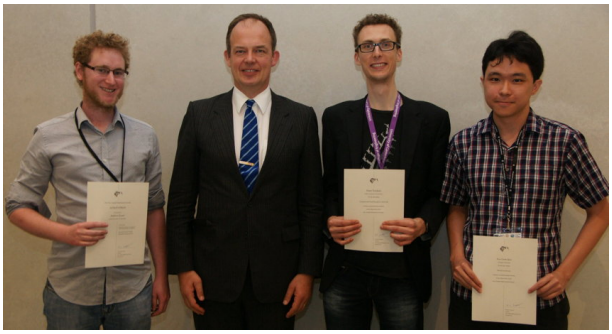
In addition we had short-term visits by this year's Maclaurin Lecturer Ingrid Daubechies (Duke University, USA) — see above, Robert Calderbank (Duke University, USA), Nicola Gaston (Victoria University of Wellington), Dimitrios Mitsotakis (Victoria University of Wellington), and Alastair Scott (University of Auckland).

Jörg Hennig

Colleagues mentioned in Local News reports: left to right, Rick Beatson; Marston Conder (with wife Jenny); Phil Wilcox.



NZMC 2015 conference dinner and awards, left to right, top to bottom: David Gauld becomes an honorary life member of NZMS; Aitken prize winners (Andrew Keane, Timm Treskatis, Vee-Liem Saw); Winston Sweatman, ANZIAM poster prize winners (Andrus Giraldo, Samin Aref, Bonnie Yu), Dion O'Neale; Hinke Osinga receives the NZMS Research award; Adam Day receives the NZMS Early Career Research award from Winston Sweatman; Graham Weir and Charles Semple, NZMS Fellows.



OBITUARY

Colleagues and friends around New Zealand were deeply saddened to hear of the death last month of Ross Renner. Ross was well known at Victoria for the many roles he played here during a long association with the university. After completing an MSc in applied mathematics in 1960, his academic career began as a junior lecturer in mathematics. Following an 8-year sojourn as Head of Mathematics at the University of the South Pacific in Fiji followed by a visiting position at the Open University in UK and a short time at the Government Department of Statistics, Ross returned to Victoria in 1978 as the University Statistician. In this role he grew the internal statistical consultancy as well as undertaking significant external contracts and introducing new course in applied statistics. Academics from across the university would have benefitted from his expertise during his 13 years in the position. Ross was promoted to Reader in 1996, by which time he had returned to a primarily research and teaching role, having completed a PhD under David Vere-Jones in 1990.

During the 1990s, many at Victoria would have encountered Ross as the convener of the Timetable Committee. In fact, Ross single-handedly built the university's timetable using his own program. It was a task he relished and one which from time to time inevitably brought him into confrontation with almost everyone, from department administrators to the Vice Chancellor. Ross usually won and the efficacy of his scientific and pragmatic approach to the task was much appreciated. Towards the end of his career at Victoria, Ross was Head of the School of Mathematical and Computing Science, again bringing his trademark forthrightness and conviction to set a direction for what was then a rather new partnership between the disciplines. He retired to Kerikeri in 2003, but maintained contact with the university and continued to work on his research into compositional statistics in geophysics, his most recent publication appearing in 2014.

In these times, in which we sometimes struggle to fulfil our role of critic and conscience of society, Ross's contribution in that domain stands as a beacon. His work on the effects of the contraceptive Depo-Provera and its effects ultimately played a role in the Cartwright enquiry into the "unfortunate experiment" at the National Women's Hospital in 1987. Other statistical research of public interest concerned the role of herbicides in intestinal cancer in sheep, differences between rural and urban health status, misuse of interest rates in loan agreements and a risk analysis of road traffic accidents. Maybe it was with some ambivalence that he also became statistical adviser for the Lotteries Commission. In characteristic form, he was quoted in the Dominion as asserting that Lotto was a "tax on stupidity". The Commission was obliged to tell him that he was "still part of the team".

A common experience of those who knew Ross well was of his immense generosity – of time, advice, wisdom and support – together with his plain-spoken incisiveness.

Ross, born in Wellington, was a naturalised Fijian. He is survived by his wife Akisi Vularewa, a hereditary Fijian chief, and their two children, Inga and Craig.

Peter Donelan

REPORTS ON EVENTS

Aitken Lecture tour of UK

It was a great surprise and honour to be invited by the London Mathematical Society (LMS) to visit the UK in October to give the 2015 Aitken lectures. This also provided a good excuse to dodge some teaching and administration duties, so I took the opportunity to stay a little longer in Europe and attend some other meetings and events.

This year the LMS is celebrating its 150th anniversary, and there have been a number of special events. My first stop was the "150th Anniversary Computer Science Colloquium" on September 17th at the Royal Society. The theme was "Algorithms and Cryptography – Apology Accepted" and I enjoyed the talks. I was then able to spend a couple of days with research collaborators in London.

Aitken lived and worked in Edinburgh. I was not scheduled to give a talk there, but decided to visit the city as a tourist anyway. Ben Martin and his family came down for the weekend from Aberdeen and it was lovely to see them. I can report that they are settled and very happy in Aberdeen.

I also managed to fit in a trip to Bordeaux for the elliptic curve cryptography conference, a workshop in Paris, and also a workshop in Ghent, Belgium. Aitken served in World War 1, both at Gallipoli and in northern France, and wrote a book ("From Gallipoli to the Somme") on his harrowing experiences. Having read the book I was interested to visit the area, and was able to do this with the help of my friends Wouter Castryck (Ghent) and Frederik Vercauteren (Leuven). It was humbling to visit the memorials and learn more about the experience of the soldiers who served there 99 years ago. Here is a photograph of me taken about 1km from where Aitken was involved in an offensive on September 26–27, 1916, and during which he sustained the injuries that ended his war (but fortunately did not end his career as a mathematician).

For my lecture tour I visited six universities (Royal Holloway University of London, Open University, Oxford, Bristol, Sheffield, Loughborough), many of which I had visited and spoken at before. Five times I gave the lecture "Linear Algebra with Errors, Coding Theory, Cryptography and Fourier Analysis on Finite Groups" and one time (at the Open University) "Kangaroos, Card Tricks and Discrete Logarithms".

I was graciously hosted at all these locations. I formerly worked at Royal Holloway, so I still know most people in the department there and it was great to see them. Oxford is also very familiar, being where I did my D.Phil, and I was hosted at New College by Kiwi mathematician Victor Flynn. I enjoyed visiting the Sir Andrew Wiles building, the glamorous new home of the Mathematics Institute. It was also a pleasure to meet a number of mathematicians in Bristol, Milton Keynes, Sheffield and Loughborough.

The LMS has provided budget for all mathematics departments in the UK to have a "150th Anniversary Reception", and three of the places I visited (Bristol, Sheffield and Loughborough) chose to schedule that reception to coincide with my lecture. Here is a photograph of the impressive cake that was baked for the event in Sheffield.

During the trip several people shared with me their personal connections with Aitken. At Royal Holloway, Eira Scourfield (who did her PhD in Glasgow) told me she had attended a lecture in Glasgow given by Aitken. In Bristol, I met Elmer Rees who had been a previous Forder lecturer to New Zealand. He described himself as "Aitken's replacement" in Edinburgh, since he had been hired there as a young man after Aitken's retirement. In Sheffield I met Hugh Porteous whose father had been a good friend of Aitken. Hugh also studied mathematics in Edinburgh and had attended lectures by Aitken. He was able to confirm Aitken's legendary powers of mental computation, and his mission to replace the decimal system of coinage (Aitken even wrote a book "The case against decimalisation"). Hugh sent me the following by email:

"Just one more cameo of Aitken. My father and Aitken were good friends. They were of a similar age and had both experienced the trenches in the first world war. They used to have an annual trip together to St Andrews for a meeting about a bursary competition. After the meeting they would go down to the beach where Aitken would challenge the youths to a stone throwing competition. He would always win because he knew that he had to throw the stone at 45 degrees, while the youths always used a flatter trajectory. He would explain to the youths that as he was throwing the stone he was solving a differential equation in his head, so they should learn some mathematics too."

During my visits to mathematics departments in the UK, several topics of concern were frequently raised. One is the increasing attention to "impact" in research evaluations. It can only be a matter of time before the government places a similar focus on research funding in NZ. I was also interested to learn that many departments are now putting explicit focus on developing student's communication skills. Several departments I visited offer a course on communication skills, during which students prepare presentations and are even taught LaTeX.

I thank the New Zealand Mathematical Society and the London Mathematical Society for selecting me for this lectureship, and for generously providing funding.

Steven Galbraith

SIAM Conference on Applications of Dynamical Systems

With support from the New Zealand Mathematical Society travel grant, I participated in the biennial SIAM (Society for Industrial and Applied Mathematics) Conference on Applications of Dynamical Systems in May 2015 in Utah, USA. This provided me with a unique opportunity to present my work on climate modelling with delay dynamics and meet internationally acclaimed experts in the field of dynamical systems.

This year, the SIAM conference attracted several hundred attendees from around the world. The topics of the conference ranged from theoretical methods for the analysis of differential equations to a wide variety of real-world phenomena, spread across up to 13 parallel sessions. There were 13 keynote speakers, all leading researchers in the fields of dynamical systems, differential equations and numerical analysis. There were several talks that were highly relevant to my doctoral research; for example, by Charles D. Camp (California Polytechnic State University, USA) and Michael Ghil (Ecole Normale Superieure de Paris, France, and the University of California, Los Angeles). Of particular interest was the session on "Delay Dynamical Systems & Time Series Analysis", which brought together the latest research on methods and applications of delay differential equations, a subject at the heart of my research.

In the featured mini-symposium on "Time-delayed feedback", which was organised by Andreas Amann (University College Cork, Ireland), I presented my talk "Bifurcation analysis of a model for the El Niño Southern Oscillation" and had fruitful discussions with members of the audience; for example, regarding bifurcations of tori and the use of the Matlab-based tool, DDE-BIFTOOL, for analysing bifurcations of delay differential equations.

An important aspect of attending the SIAM conference was maintaining existing contacts, in particular with colleagues from the Technical University of Berlin in Germany. New contacts were also made, including other PhD students involved with delay dynamics, who had done interesting and relevant work on delayed feedbacks; for example, Zhen Wang (University of Waterloo, Canada) and Sergei Avedisov (University of Michigan, USA). A further highlight for me was meeting Hans Kaper, who is a highly respected and distinguished researcher in climate modelling and wrote the recent book "Mathematics and climate".

While in North America, I also attended the workshop "Delay differential equations in physical sciences and engineering" at the Fields Institute in Toronto, Canada. This was particularly beneficial for meeting new contacts, and maintaining existing ones, on the specific topic of delay dynamics. During this workshop I presented a poster on the topic of climate modelling with delay and received feedback from renowned experts from the field; for example, Eckehard Schöll (Technical University Berlin, Germany) and Gabor Stepan (Budapest University of Technology and Economics, Hungary).

I would also like to thank the NZ branch of ANZIAM, SIAM, as well as the University of Auckland for contributing towards the attendance costs of the conference.

Andrew Keane (PhD student, University of Auckland)

Australia and New Zealand Mathematics Convention 2014

With the support of the NZMS I attended the Australia and New Zealand Mathematics Convention 2014 at the University of Melbourne. I had never been to Melbourne; I was welcomed by 18 degree overcast weather, very familiar to back home in Palmerston North! My first impressions were of an extensive public transport system with trams trundling up the middle of the streets, a fairly busy city – but not too busy, lots of trees and grass, and plenty of old buildings on the campus. I missed the registration on Sunday night, but quickly found my feet on Monday morning at the opening session. I think there were about four hundred people attending the conference, which made for busy crowded sessions. At the opening session four prizes were handed out, and talks given by the recipients. The winners all seemed to be working in number or group theory: areas that are a bit beyond me. However Cheryl Praeger, who won the George Szekeres medal, gave an entertaining talk loosely based around "symmetry". She remarked that she didn't like formulae, preferring words, which made for a less dense and easier to understand talk. The opening session was followed by two plenary talks, the first by Rosalind Archer from Auckland about her experiences in modelling oil wells and fracking; and the second by Nina Snaith on Random Matrix theory and Number Theory, which was surprisingly accessible to even the likes of myself. Did you notice I have only mentioned woman speakers? Yes, there were a lot of women speakers throughout the conference, especially at the plenary sessions. During the afternoon I bailed on the Computational Mathematics special session, which is really where I should have been, as my talk the following day was in that session, and instead went to the Mathematics Education special session. It was a mixed bag: one talk was more an audience discussion were I only learned that no one had any concrete advice or clear ideas; an interesting eye opener into what level of Math-nursing students have and need (learning to multiply and divide by 1000 to convert between milli and micrograms seems to be a very important, and tragically not completely understood, skill); a couple of lack lustre talks on experiences in the trenches; and a fantastic talk by Heather Lonsdale on how she turned the two most hated and failed Math courses at Curtin University around, using amongst other things the approach of using Draft submissions of math assignments. Monday wrapped up with a BBQ, with vegetarian food too, courtesy of the Australian Mathematical Sciences Institute.

Tuesday started with an exquisite hand written Plenary talk by Maria Angelica Cueto from Columbia University who talked about Non-Archimedean Combinatorics (another talk that went right over my head!). The second plenary by Swiss Nicolas Monod (the first male I've mentioned) titled "100 years of duplication" celebrated the 100th anniversary of Hausdorff's famous paradox, whereby a sphere is cut into three pieces that are then rotated to cover that same sphere twice. He was entertaining and gentle on the listener. The rest of the day was spent in the Computational Math session where the quality of talks varied enormously. Some notable talks, in no particular order, were: a more-or-less advertisement for Maple with very little Math content; a talk by yours truly which seemed reasonably well received; a John Butcher special on Cohesive structure preserving general linear methods where he raced through 97 slides (OK, some of them were half slides) in 25 minutes; and a talk by William McLean on his finite element teaching code he had written in Julia, which inspired me to investigate another programming language. The day wrapped up with a very enjoyable public lecture on geometry by the affable Hyam Rubinstein (lots of diagrams of spheres, tori, knots etc on the chalkboard), followed by a stroll downtown and a Mexican dinner.

I won't go into all the details of Wednesday, except to mention two excellent talks: firstly I had my mind changed by Deborah King who overwhelmingly convinced us that traditional lectures should not be recorded; and secondly Bill Barton discussed the undergraduate LUMOS project. I wish Massey could be part of such an innovative project that is rethinking how to teach undergraduate math.

Thursday was another round of good talks followed by the conference dinner at the race course; a fancy affair with good food and even dancing. Awards were given out, including best student talks both in Australia and NZ, and the Australian students gave an award for the best non-student talk, which went to Nicolas Monod. I liked the idea of giving an award to the best non-student.

The conference was winding down on Friday, and during the afternoon I skipped the last couple of talks to visit La Trobe University to meet Professor Reinout Quispel. He had provided some inspiration for my research, and I spent an enjoyable afternoon discussing all sorts of things, including some mathematics.

Over all, the conference was an excellent opportunity for me, with a broad range of talks and people!

Matt Wilkins (PhD student, Massey University)

General Relativity and Gravitation: a centennial prospective

With the generous financial support of the New Zealand Mathematical Society, I attended the international conference "General Relativity and Gravitation: a centennial prospective", at the Pennsylvania state university, USA. This conference was organized with the aim of commemorating the 100 year anniversary of the theory of general relativity. The majority of the current leaders in the area were present, hence it was a unique opportunity for me to meet them and establish some networks for possible future collaborations.

There were several highly relevant talks on a wide range of topics in the area, such as the detection of gravitational waves, quantum gravity, cosmology and numerical relativity. Even though I was not very familiar with the topics of some talks, the attendance to these was an opportunity to get an idea about their current status, relevance and impact in the area of general relativity. This was particularly meaningful to me because learning something about these different topics allows me to get a general overview of the field that I am working in, which lead me to identify the importance of my current research project and how it may interact with other topics in the area.

Regarding my talk, I had the opportunity to present part of my PhD project about the numerical solution of vacuum spacetimes with spherical spacial topology. It was a great experience because I got some pertinent and positive feedback from experts in my specific topic which can really help me to improve and expand my current research project. In particular, I had the opportunity to have a great discussion with Prof. David Garfinkle (who is very well known in my field) about my presentation. He was very interested in my numerical approach to this sort of problem and, even more, he suggested a couple of possible applications that we could probably tackle in a future collaboration. Since I am in the last stage of my PhD, I consider this kind of networking as extremely important for my academic future once I complete my PhD.

To conclude, I consider it to have been a very fruitful experience for several reasons. It opened my mind to a wider perspective of my research field and allowed me to do some valuable networking that might open doors to several opportunities like possible research collaboration and, why not, a good job. Once again, I thank the NZMS for providing me with the travel grant which contributed to this valuable experience.

Leon Escobar Diaz (PhD student, University of Otago)

INDOCRYPT 2014

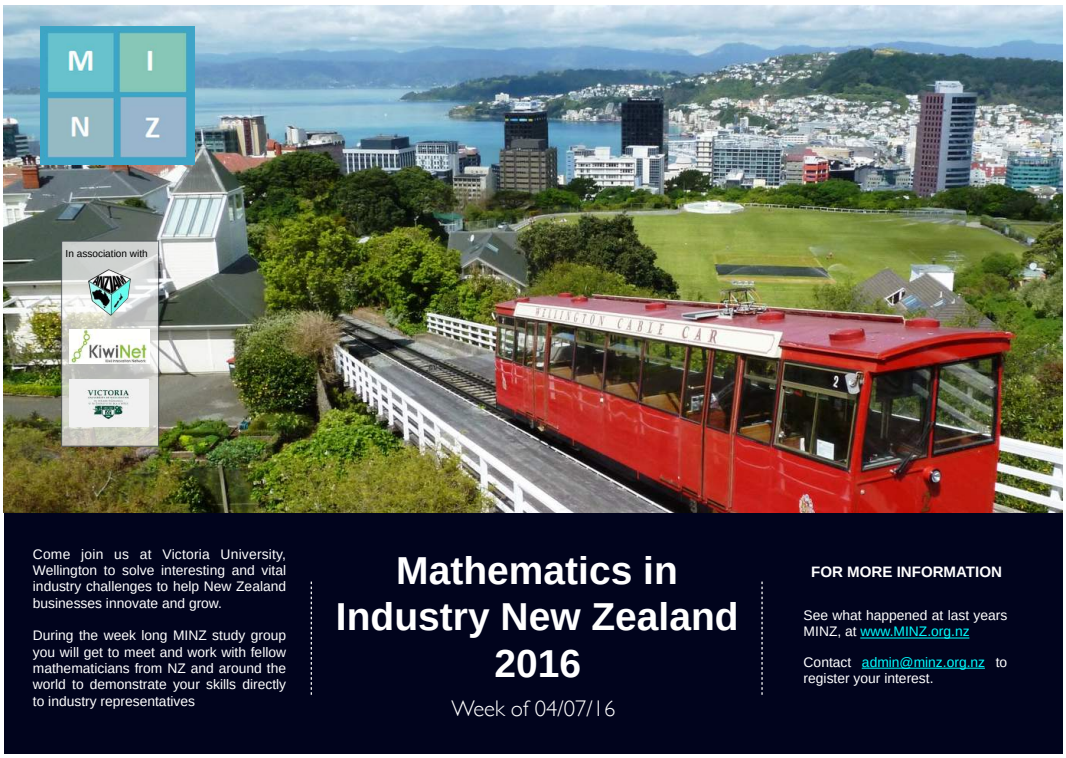
It felt wonderful to attend the 15th International conference on cryptology (INDOCRYPT2014) conference held on December 14–17, 2014 in New Delhi, India and present my work. There were 25 papers selected to the conference including my paper with my supervisor, Steven Galbraith. Most of the papers focused on symmetric primitives (block cipher design/analysis, stream cipher design/analysis, hash functions cryptanalysis, authentications schemes and their analysis, etc.), while there were a few, including mine, on public key cryptography; In addition to mine, there were two papers entitled "Binary Edwards curve Revisited" and "A Quantum Algorithm for Computing Isogenies between Supersingular elliptic curves". At the end of the paper talks, specific questions related to the papers were raised and appropriate solutions were given.

Our paper was on enhancing the Index calculus algorithm in solving the discrete logarithm problem defined on the binary Edwards curve. Our findings are that, despite our improvements, Pollard's rho algorithm and its variants remain the best algorithms so far for solving the elliptic curve discrete logarithm problem. Our findings give confidence to the security assurance of cryptosystems that make use of the elliptic curve discrete logarithm problem as proof of their security.

Apart from our work, I was impressed with the findings of quantum algorithms to compute isogenies between supersingular elliptic curves. Naturally computing isogenies between supersingular elliptic curves is hard, and it is believed to be still hard even for quantum computers. But, the paper titled "A Quantum algorithm for computing isogenies" found a quantum algorithm to compute the isogenies under consideration, although I am a bit suspicious of the paper.

Overall, I enjoyed listening to invited speaker Phillip Rogaway of the University of California (USA) on authentication encryption schemes. Two other speakers, Maria Naya from France and Marc Joye from the USA, gave their talk on lightweight block ciphers and their security, and recent advances in ID-Based Encryption respectively. During the breaks I also had the opportunity to talk and discuss what everybody else is doing, which gave me the opportunity to express myself well and to enhance my knowledge. It was a pretty amazing trip accompanied by the delicious hot spicy food of India.

Shishay Gebregiyorgis (PhD student, University of Auckland)



GENERAL NOTICES

Royal Society of NZ

(We asked Gaven to provide some details of his role at the Royal Society of New Zealand, and how it relates to mathematics).

Early last year I was elected as Vice President [Physical Sciences, Mathematical Sciences, Technology and Engineering] of the Royal Society of New Zealand (RSNZ). For most mathematicians I guess the primary intersections with the Royal Society is through their running of the processes around the Marsden Fund, Rutherford Fund and the Alert Newsletter (and perhaps the last CoRE round), but the organisation does much more, awarding various Medals (including our own Jones Medal for lifetime achievement, and every three years the Hector Medal in the mathematical sciences). You can find out about RSNZ (and other medals and activities) at http://www.royalsociety.org.nz.

The Royal Society of New Zealand is an independent statutory organisation (running under an act of Parliament) that promotes and advances science, technology and the humanities in New Zealand. At the organisation's core is the Academy of elected Fellows, New Zealand's top scholars and scientists. In the last few years the mathematical sciences have been extraordinarily successful in electing its members to Fellowship – a fairly significant achievement in anyone's career. This year we had Alexei Drummond and Thomas Lumley (you might even count Nic Smith!), Iain Raeburn the year before, with Mike Fellows as an honorary fellow. As best as I can remember John Butcher (1980) was the first Mathematician (consider that RSNZ has been electing Fellows since 1919) so we are making progress!

Another of RSNZ's primary activities these days is in providing "expert advice" to the public and to policy makers. Recent activity in this area can be found at http://www.royalsociety.org.nz/expert-advice/ and these cover off a wide spectrum of public debate in and around issues of science/technology/social science and so forth.

The RSNZ has changed its structure in recent years to better advance its mission. There are no longer discipline based panels, such as some of you may have served on, but now biannual forums where constituent members get together to discuss not only discipline issues, but other organisational and scientific issues. The last such Forum was a couple of weeks ago and we had representatives from Geoscience Soc., Meteorological Soc., NZ Association of Math. Teachers, NZ Association of Science Educators, NZ Institute of Chemistry, NZ Institute of Food Science and Technology, NZ Institute of Physics, Royal Astronomical Soc., NZ Institute of Surveyors, NZ Math. Society, NZ Statistical Association, and the NZ Association of Scientists at my group alone. You can imagine that the discussion was wide ranging, but key issues were diversity in the RSNZ, support for infrastructure, science subjects in the NCEA, and membership issues in the organisations represented (a full list of the constituent organisations is at http://www.royalsociety.org.nz/membership/electoral-college-list/).

If you are not already a member of RSNZ then I'd encourage you to join. Further, if you think you are at the stage in your career where Fellowship is a possibility, you should talk to someone senior you trust and see if they can't facilitate a nomination – and I'm always happy to help.

Gaven Martin

Mathematics-in-Industry for New Zealand-Study Group: 2016

The second annual workshop in this series is to be held at Victoria University of Wellington from 4–8 July 2016. (See previous page for advertisement — *Ed.*)

It will be co-chaired by Professor Emeritus Graeme Wake (Massey University, Auckland) and Professor Mark McGuinness (Victoria University of Wellington). It will be organised in partnership with KiwiNet, which is a consortium of Universities and Crown Research Institutes in New Zealand focused on transforming clever science into commercial value. All members, and especially students and teachers, are invited to attend, and there are no fees. It is expected there will be six industrial problem challenges to explore and there will be grants available on application to student participants from outside of the Wellington region. Interested persons are invited to visit the MINZ-website for more information http://www/minz.org.nz and to register your interest at admin@minz.org.nz.

Graeme Wake

NZMS Notices: Minutes of 41st Annual General Meeting, 1 Dec 2015

Present: Astrid an Huef, Rick Beatson, John Butcher, Brendan Creutz, Adam Day, Peter Donelan, David Gauld, Emily Harvey (minutes), Stephen Joe, Bernd Krauskopf, Dillon Mayhew, Robert McKibbin, Maarten McKubre-Jordens, Fabien Montiel, Rua Murray, Graeme O'Brien, Lynette O'Brien, Dion O'Neale, Hinke Osinga, Iain Raeburn, Nicolette Rattenbury, Charles Semple, Gunter Steinke, Winston Sweatman (chair), Steve Taylor, Timm Treskatis, Chris Tuffley, Bruce van Brunt, Graeme Wake, Graham Weir, Mark Wilson, Nicholas Witte.

Apologies: Marston Conder, Vivien Kirk, Carlo Laing, Mark McGuinness, Robert McLachlan, Mick Roberts.

Meeting opened 5:10pm, closed 5:50pm.

1. Minutes of the 40th Annual General Meeting were accepted (Winston Sweatman/Emily Harvey, passed).
2. Matters Arising. None.
3. President's report. Winston Sweatman read his report (as tabled). The President's report was accepted (Winston Sweatman/Dion O'Neale, passed).
4. Treasurer's report. Bruce van Brunt spoke about his report (as tabled). It was noted that this year the accounts received the auditor's "unqualified opinion" thanks to work by John Shanks on the membership fees breakdown accounting. It was noted that the high balance in the Current account is because the Butcher-Kalman donation money is currently in this account; they will be transferred to a named term deposit later this year. The Treasurer's report was accepted (Bruce van Brunt/Graeme Wake, passed).
5. Appointment of auditors. The current auditor, Nirmala Nath from the School of Accountancy, Massey University, is to be re-appointed as Auditor. (Bruce van Brunt/Winston Sweatman, passed).
6. Membership secretary's report. Was presented (as tabled) by Winston Sweatman. John Shanks will stay on as membership secretary. The meeting would like to thank John Shanks for his contribution and long service (Winston Sweatman/Bruce van Brunt, passed).
7. Election of councillors.
   (a) Alex James is departing from the Council after two terms, and Mark McGuinness has finished his first term; the Society thanks them for their service.
   (b) There were two nominations for Council: Vivien Kirk (Dion O'Neale/Shaun Hendy), Mark McGuinness (Vivien Kirk/Claire Postlethwaite). Vivien Kirk and Mark McGuinness were elected uncontested.
8. Report of 2015 Colloquium. Rua Murray would like to thank his committee for all their help, and the sponsors for their support, including the RSNZ Constituent Organisation fund which awarded the conference $1500+GST. The number of attendees this year is around a quarter of the overall mathematics faculty, which is disappointing. It was noted that this meeting is an asset for the NZ mathematics community, playing a role in building connections within the community across a broad range of research areas. It is important for the continuing success of the Colloquium that we keep attendance and engagement high. The NZMS Council will survey the members via email in the new year to ask for feedback and suggestions on how to make the meeting more appealing and how to reduce barriers to attendance, including possible future joint meetings and meeting timing.
9. Forthcoming colloquia. The 2016 Colloquium will be held at Victoria University in Wellington. Possible venue for 2017 is Auckland(?). Otago will host in 2018 or 2019 as the next Te Waipounamu (South Island) meeting.
10. Report on NZ Journal of Mathematics presented as tabled by David Gauld. The archives of the journal are not hosted on the NZJM or NZMS websites due to file size issues, but that remains the long term goal. Douglas Bridges has retired from the committee after over two decades of service. He has been replaced by Shaun Cooper.
11. Report from the NZMS Education Group. Dillon Mayhew reported on the progress of the NZMS Education Group, whose stated purpose is "to provide the New Zealand community with independent and hopefully influential commentary on mathematical education issues". The group organised the Mathematics Education afternoon at the colloquium this year. They have a newly set up online presence on the NZMS website, as well as social media accounts on twitter and facebook (co-ordinated by Stephen McConnachie). NZMS members are encouraged to get involved.
12. Update on Forder, Aitken, and Maclaurin lecturers. As in President's report.
13. General business. Vote of thanks to Winston Sweatman for all his work on the NZMS Council (Stephen Joe/Emily Harvey, passed).

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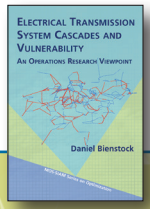

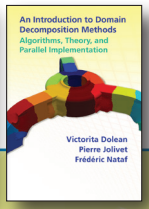

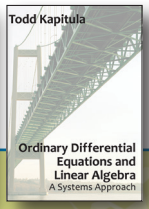

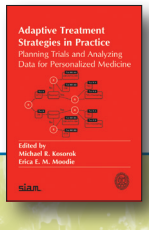

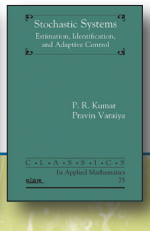

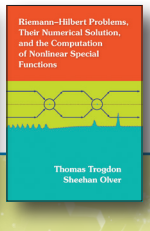

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Daniel Bienstock

MOS-SIAM Series on Optimization 22

As power grids and populations grow, robustness is a factor that planners must take into account. This book sheds light on this complex problem by introducing the engineering details of power grid operations from the basic to the detailed; describing how to use optimization and stochastic modeling, with special focus on the modeling of cascading failures and robustness; providing numerical examples that show "how things work"; and detailing the application of a number of optimization theories to power grids.

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Todd Kapitula

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Michael R. Kosorok and Erica E. M. Moodie, Editors

ASA-SIAM Series on Statistics and Applied Probability 21

Personalized medicine is a medical paradigm that emphasizes systematic use of individual patient information to optimize that patient's health care, particularly in managing chronic conditions and treating cancer. In the statistical literature, sequential decision making is known as an adaptive treatment strategy (ATS) or a dynamic treatment regime (DTR). The authors provide a learning-by-seeing approach to the development of ATSs, aimed at a broad audience of health researchers.

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P. R. Kumar and Pravin Varaiya

Classics in Applied Mathematics 75

Decision making under uncertainty has grown into a diversified area with application in several branches of engineering and in areas of the social sciences. This book provides succinct and rigorous treatment of the foundations of stochastic control; a unified approach to filtering, estimation, prediction, and stochastic and adaptive control; and the conceptual framework necessary to understand current trends in stochastic control, data mining, learning, and robotics.

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