

DEPARTMENT OF MATHEMATICS

ANNUAL REPORT 1996

PREAMBLE

The Department of Mathematics is one of three departments in the School of Mathematical and Information Sciences, together with Computer Science and Statistics, offering courses at all levels for students in several Faculties. It comprises over 70 established and temporary academic staff, based on two sites (the City campus and Tamaki campus), and with the number of equivalent full-time students exceeding 900 in 1996 the Department is one of the largest at the University of Auckland.

The Department has two units which operate with a certain degree of autonomy: the Applied & Computational Mathematics Unit, and the Mathematics Education Unit, and also some staff are actively involved in the Centre for Discrete Mathematics and Theoretical Computer Science and the Mathematical Biology Research Unit. The Department has particular research strength in algebra, combinatorics, complex analysis, differential equations and mathematical modelling, functional analysis and operator theory, history of mathematics, numerical analysis, and topology.

Highlights in 1997 include the award to Associate-Professor M.K. (Vaman) Vamanamurthy of the New Zealand Mathematical Society's Research Award, to Professor John Butcher of the Royal Society of New Zealand's prestigious Hector Medal and to Dr Paul Hafner of a Faculty of Science Distinguished Teaching Award. Also the Department experienced a pleasing 44% growth in its number of postgraduate students.

Our major concern (which has not been adequately addressed despite several pleas over the last few years) is our severe shortage of desk space for postgraduate students, tutorial and computer laboratory facilities for undergraduate students, and office accommodation for staff and visiting researchers.

I DEVELOPMENTS IN TEACHING

The Department of Mathematics provides teaching in papers for students in several faculties, traditionally Arts, Engineering and Science, but now also a large number of students in Commerce.

The advent of semesters in 1996 provided an opportunity for the introduction of some new papers at the undergraduate level and the rationalisation of the Department's offerings at the graduate level.

New papers included 445.130 (an accelerated Stage 1 paper in core mathematics for students with high marks in Bursary Mathematics), 445.230 and 445.231 (repackaging the former advanced papers 26.132 and 26.231), 445.322 (a 1-point paper in Applied Linear Algebra), 445.326 (Combinatorial Computing), 445.347 (Advanced Calculus, for BTech and other students at Tamaki), 445.361 and 445.362 (Advanced Methods in Applied Mathematics, replacing a range of former Stage 3 papers), 445.367 (Advanced Applied and Computational Mathematics for BTech and other students at Tamaki), and 445.372 (an Industrial Mathematics Clinic as part of the BTech programme). The latter is a new style of paper for the Department: an industrial case study involving the formulation, solution and interpretation of a problem presented by an industrial client (for 1996 modelling the dynamics of an automatic washing machine).

Papers at the graduate level were rationalised in line with the general move from 24 lectures (2 credits) to 36 lectures (2 points) per paper, providing an opportunity to make the Department's offering more focussed. Four papers (two in Mathematics and two in Physics) are shared with the Physics Department in a popular and successful arrangement which may serve as a model for further interdisciplinary activity.

In each of the 2 semesters, student numbers totalled approx. 900 effective full-time students (EFTSs), including 850 undergraduate EFTSs (730 on the City campus and 120 at Tamaki), and 52 postgraduate EFTSs. Undergraduate EFTSs on the City campus decreased considerably (approx. 12%) from 1995 due to the loss of students in the Engineering Intermediate programme and lower numbers of students enrolled in degree programmes in the physical sciences, but were partially compensated for by an increase in the number of students enrolled in our Mathematics for Commerce papers 445.108 and 445.208, and an increase of 34% on the Tamaki campus. Postgraduate EFTSs increased by 44% from 1995, mainly due to an increase in the number of PhD students from 15 to 26, which is very pleasing and is having a very positive effect on the Department.

Unfortunately resources have not kept pace with our considerable growth over the last few years — indeed we are now in a situation where **the Department receives (in salaries and operating funds etc.) less than 45% of the income to the University generated by government subsidies and tuition fees for students enrolled in Mathematics, and also has less**

than 45% of the space recommended by the UK UGC norms. The effect is that we are unable to meet the learning needs of a large number of students (in terms of tutorial assistance and adequate computer laboratories), or to offer scholarships and other support to senior students competitive with those offered in other Departments and face a severe shortage of desk space for postgraduate students and office space for staff and research fellows.

On the teaching front some changes were necessary due to semesterisation, however many of these were minimal for papers previously taught on a half-year basis. The number of streams of papers 445.151 and 445.152 was reduced due to lower enrolments, and an additional stream mounted to cater for increased enrolments in papers 445.107 and 445.108. Development of teaching methods and assessment continued with the help of input from staff of the Mathematics Education Unit (in seminars organised for SMIS) and SECAT results were generally quite good — with all but only a small number of staff scoring 4.4 or more for teaching effectiveness — especially good for a quantitative subject with large class sizes.

At the end of the year a survey was undertaken to assess the merits and operation of the Department's tutorial assistance room, and also a programme of cyclical review of course offerings was initiated. This programme will begin in 1997 with a review of the core papers 445.151, 445.152, 445.162, 445.251, 445.252 and 445.260. Another new development was the establishment of web pages for each paper so that prospective students can access information about the Department's course offerings electronically.

A highlight of the academic year was the award of both an SMIS Director's Award for Teaching Excellence and a Faculty of Science Distinguished Teaching Award to Dr Paul Hafner, for sustained high performance in teaching over several years, and for incorporating electronic teaching resources into his papers (in particular using the world wide web for student access).

II OTHER STUDENT MATTERS

Scholarships and Prizes

Sir George Grey Scholarship	Gregory Ball
Senior Scholarship in Applied Mathematics	Gregory Ball
Senior Scholarship in Pure Mathematics	Lara Jamieson
Annual Prize in Applied Mathematics	Emily Lane
Annual Prize in Pure Mathematics	Robyn Curtis
Collins Prize in Mathematics	Alexander Krägeloh
Montgomery Memorial Prize	Kahlil Hodgson
Mathematics Education Prize	Anne Buzeika
University of Auckland Masters Scholarships	Emily Lane
University of Auckland Doctoral Scholarships	Chistopher Heath
	Rowan Killip
	John MacCormick
	Rachel Weir
Mathematics Department Masters Scholarships	Robyn Curtis
	Louise Parsons
Faculty of Science Fees Scholarships	Louise Parsons
	Steven Taylor
	Matthew Tearle
	Ieuan Wickham

Summer Scholarships

About 35 students were engaged in research projects over the summer, with scholarship support from the Department. Some took part in the Mathematics summer workshop on solvable models in statistical mechanics at Tolaga Bay in January, and an instructional workshop on algebra, geometry and topology at the Australian National University in Canberra in February. Some others assisted staff with computational or practical aspects of individual research projects, or in the preparation of papers and other resource materials. This programme of summer scholarships has proved invaluable to both students and staff and we expect to continue to be able to offer it in the future.

Student/Staff Liaison Committee

A Student/Staff Liaison Committee (comprised of staff and student representatives from all levels) met informally four times in the year, providing a successful means of two-way communication between students and staff in the Department on matters of common concern such as course and degree structures, and more general issues such as tutorial facilities and the effects of semesterisation.

III RESEARCH

1. GENERAL/HIGHLIGHTS

The Department of Mathematics has a very strong research programme, with several of its staff among the world leaders in their fields, and attracts a large number of visitors each year as well as an increasing number of postgraduate students and significant research awards and funding. In 1996 no fewer than nine staff gave invited lectures at international conferences, and Professors David Gauld and Boris Pavlov won grants from the Marsden Fund — in fact of the 40 Marsden Fund grants awarded to the University of Auckland staff so far, seven have been awarded to members of the Mathematics Department, reflecting the very high international standing it enjoys in research.

Of particular note are two awards in 1996 to staff of the Department for their outstanding achievements:

In July Assoc. Prof. M.K. (Vaman) Vamanamurthy was presented with the N.Z. Mathematical Society's Research Award for 1996, with the accompanying citation "*for his prolific and far-reaching work in analysis and topology, especially for his contributions to the theory of quasiconformal mappings and special functions — contributions that are characterized by both analytic ingenuity and geometric insight*". These awards were initiated in 1990 to foster and promote mathematical research in New Zealand and to recognise the research achievements of N.Z. mathematicians. This is the fourth award to a member of the Mathematics Department at the University of Auckland, with previous award winners including Professors John Butcher (1991), Marston Conder (1993) and Gaven Martin (1994).

In November Prof. John Butcher was awarded the Hector Memorial Medal by the Royal Society of New Zealand. This medal is New Zealand's premier scientific honour and is awarded annually, in rotation amongst various sciences. It was named in memory of Sir James Hector (1834-1907), a pioneering New Zealand scientist, doctor and explorer. Amongst its recipients is Ernest Rutherford (1916), and the last occasion when it was awarded to a mathematical scientist was in 1982 when the recipient was Roy Kerr, for his work in the theory of relativity. John Butcher has been honoured by the award of the Hector medal for his work in the numerical solution of ordinary differential equations.

2. PUBLICATIONS

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(d) Papers in Refereed Conference Proceedings

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(e) Reviews and Comments

- CONDER, M.D.E.: D. Moldavanski and N. Sibyakova, *On the finite images of some one-relator groups*, Review in *Mathematical Reviews* 95i:20051, p.1949, 1995.
- CONDER, M.D.E.: J. Harlander; *On perfect subgroups of one-relator groups*, Review in *Mathematical Reviews* 96a:20040, 1996.
- CONDER, M.D.E.: J. Howie, V. Metaftsis, and R.M. Thomas, *Finite generalized triangle groups*, Review in *Mathematical Reviews* 96a:20041, 1996.
- CONDER, M.D.E.: L. Lévai, G. Rosenberger and B. Souvignier, *All finite generalized triangle groups*, Review in *Mathematical Reviews* 96a:20042, 1996.
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- CONDER, M.D.E.: M. Gradolato and B. Zimmermann, *Finite quotients of hyperbolic tetrahedral groups*, Review in *Mathematical Reviews* 96f:20074, 1996.
- CONDER, M.D.E.: M. Hagelberg, C. Maclachlan and G. Rosenberger, *On discrete generalized triangle groups*, Review in *Mathematical Reviews* 96g:20043, 1996.
- CONDER, M.D.E.: M. Edjvet and J. Howie, *On the abstract groups $(3, n, p; 2)$* , Review in *Mathematical Reviews* 96j:20043, 1996.
- CONDER, M.D.E.: S. Ganief and J. Mooiri, *rX -complementary generations of the Janko groups J_1 , J_2 and J_3* , Review in *Mathematical Reviews* 96k:20026, 1996.
- DIKSHIT, G.D.: C. Frappier and P. Oliver, *Inequalities and representation formulas for functions of exponential type*, Review in *Zentralblatt für Mathematik* 828.41002, 237, 1996.
- DIKSHIT, G.D.: S.G. Gal, *Properties of the modulus of continuity for monotonous convex functions and applications*, Review in *Zentralblatt für Mathematik* 828.41004, 237, 1996.
- DIKSHIT, G.D.: I. Solak, *Matrix sequences on certain generalised sequence spaces*, Review in *Zentralblatt für Mathematik* 829.40002, 220, 1996.
- DIKSHIT, G.D.: A. Rababah, *Quadratic piece-wise approximation with high accuracy*, Review in *Zentralblatt für Mathematik*, 830.41008, 208, 1996.
- DIKSHIT, G.D.: E. Malkowsky, *A study of the \mathfrak{a} -duals for $w^\bullet(p)$ and $w_0(p)$* , Review in *Zentralblatt für Mathematik* 833.40006, 247-248, 1996.
- DIKSHIT, G.D.: M. Basarir and E. Savas, *On matrix transformations of some generalised sequence space*, Review in *Zentralblatt für Mathematik* 833.40006, 248, 1996.
- DIKSHIT, G.D.: P.N. Agrawal and V. Gupta, *Inverse theorem for linear combination of modified Bernstein polynomials*, Review in *Zentralblatt für Mathematik* 833.41011, 251, 1996.
- DIKSHIT, G.D.: Y.N. Drozhzhinov and B.I. Zavyalov, *A Tauberian theorem for quasi-asymptotic decompositions of measures with supports in the positive octant*, Review in *Zentralblatt für Mathematik* 834.40003, 245, 1996.
- DIKSHIT, G.D.: Y. Shi, *A note to problem XXXV of P Turán*, Review in *Zentralblatt für Mathematik*, 837.41006, 255, 1996.
- DIKSHIT, G.D.: Y.Hu; D. Leviatan and X.M. Yu, *Copositive polynomial and spline approximation*, Review in *Zentralblatt für Mathematik*, 837.41007, 255, 1996.
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- VAMANAMURTHY, M.K.: D. Partyka, *On the maximal dilatation of the Douady-earle Extension*, *Annals University Mariae Curie-Slkodowska*, XLVIII, 8, 80-97, MR: 96m: 300031, 1996.

(f) Technical Reports

Mathematics Department Research Report Series:

- 332 TEE, G.J., 'Integer Sums of Powers of Cosines and of Secants (MOD P), for Prime P ', 30 pages, January 1996.
- 333 AN, J., 'Dade's Conjecture for 2-Blocks of Symmetric Groups', 28 pages, March 1996.
- 334 GOOD, C.³, McINTYRE, D.W., and WATSON, W.S.⁴, 'Measurable Cardinals and Finite Intervals between Hausdorff Topologies', 15 pages, March 1996.
- 335 FOX, C., HASKELL, T.³, and WILCOCKS, L., 'A Calculation of Sea-Ice Young's Modulus Using Under-Pressure Measurements', 22 pages, April 1996.
- 336 BUJALANCE, E.⁴, and CONDER, M.D.E., 'On cyclic groups of automorphisms of Riemann surfaces', 17 pages, May 1996.
- 337 CONDER, M.D.E., MORTON, M.J., and PRAEGER, C.E.⁴, 'Partition Graphs for Finite Symmetric Groups', 14 pages, May 1996.
- 338 PRITCHARD, G.³, WILSON, M. and WOOD, D.H.³, 'Bell's Primeness Criterion for $W(2n + 1)$ ', 11 pages, July 1996.
- 339 WILSON, M., 'Crossed Products of Restricted Enveloping Algebras', 8 pages, July 1996.
- 340 QIU, S.-L.³, VUORINEN, M.³, and VAMANAMURTHY, M.K., 'Some Inequalities for the Growth of Elliptic Integrals', 23 pages, July 1996.

- 341 TEE, G.J., 'Integer Sums of Powers of Tangents and Cotangents (MOD p) for Prime p ', 20 pages, August 1996.
- 342 GEHRING, F.W.⁴, and MARTIN, G.J., 'Geodesics in hyperbolic 3-folds', 14 pages, August 1996.
- 343 GEHRING, F.W.⁴, and MARTIN, G.J., 'The volume of hyperbolic 3-folds with p -torsion, $p \neq 6$ ', 15 pages, August 1996.
- 344 MARTIN, G.J., 'On the Geometry of Kleinian Groups', 28 pages, August 1996.
- 345 CAO, J., GEHRING, F.W.³, and MARTIN, G.J., 'Lattice constants and a lemma of Zagier', 20 pages, August 1996.
- 346 HINKKANEN, A.⁴, and MARTIN, G.J., 'Some properties of semigroups of rational functions', 8 pages, August 1996.
- 347 SHARP, P.W., 'User guide for BEL4', 21 pages, August 1996.
- 348 SHARP, P.W., 'BEL4: an explicit Bel'tyukov integrator for Volterra integral equations of the second kind', 13 pages, August 1996.
- 349 MARSHALL, T., 'Asymptotic Volume Formulae and Hyperbolic Ball Packing', 14 pages, November 1996.
- 350 ALON, N.³, and MARSHALL, T., 'Homomorphisms of Edge-coloured Graphs and Coxeter Groups', 9 pages, November 1996.
- 351 MARSHALL, T., 'Truncated Tetrahedra and their Reflection Groups', 47 pages, November 1996.
- 352 MARSHALL, T., 'Geometry of Pseudospheres I', 21 pages, November 1996.
- 353 MARSHALL, T., 'Geometry of Pseudospheres II', 21 pages, November 1996.
- 354 CONDER, M.D.E., and WILSON, S.⁴, 'Inner reflectors and non-orientable regular maps', 8 pages, November 1996.
- 355 CONDER, M.D.E., and WALKER, C., 'Vertex-transitive graphs with arbitrarily large vertex-stabilizer', 11 pages, November 1996.
- 356 TAYLOR, S.W., 'Boundary Control of a Timoshenko Beam with Variable Physical Characteristics', 20 pages, November 1996.
- 357 JIANG, S.⁴, and YIN, F.³, 'On a Katuta-Junnilla Problem', 14 pages, October 1996.
- 358 GEHRING, F.W.⁴, MACLACHLAN, C.⁴, and MARTIN, G.J., 'On the Discreteness of the Free Product of Finite Cyclic groups', 7 pages, November 1996.
- 359 HINKKANEN, A.⁴, and MARTIN, G.J., 'Attractors in quasiregular semigroups', 9 pages, November 1996.
- 360 GEHRING, F.W.⁴, MARSHALL, T., and MARTIN, G., 'Collaring Theorems and the Volumes of Symmetric Hyperbolic n -Manifolds', 26 pages, November 1996.
- 361 HODGSON, K., 'Shortest Single Axioms for the Equivariant Calculus with CD and RCD*', 38 pages, November 1996.
- 362 SHARP, P.W., and VERNER, J.H.³, 'Some extended explicit Bel'tyukov pairs for Volterra integral equations of the second kind', 15 pages, November 1996.
- 363 SHARP, P.W., and VERNER, J.H.³, 'Dual precision software for checking explicit Runge-Kutta methods', 14 pages, November 1996.
- 364 AN, J., 'The Alperin and Dade Conjectures for the Simple Conway's Third Group', 17 pages, November 1996.
- 365 TAYLOR, S.W., 'Regions free of resonance poles for Schrödinger operators with non-smooth potentials', 9 pages, December 1996.
- 366 SHARP, P.W., and VERNER, J.H.³, 'RKCHK user guide', 19 pages, December 1996.
- 367 CAO, J., KÜNZI, H.P.A.³, REILLY, I.L., and ROMAGUERA, S.³, 'Quasiuniform Hyperspaces of Compact Subsets*', 12 pages, December 1996.
- 368 FEDOROV, S., 'Angle between Subspaces of Analytic and Antianalytic Functions in Weighted L2 Space on a Boundary of Multiply Connected Domain', 27 pages, December 1996.

(k) Other Works

TEE, G.J., 'Ken Ashton 1935-1995', *The New Zealand Mathematical Society Newsletter* **66**, 18-19, 1996. (Reprinted in *The New Zealand Mathematics Magazine* 33(2) 57-59, 1996).

- BARTON, W., 'Untangling the Net of Culture', Invited Keynote Address to WG21 International Congress on Mathematics Education, Seville, July 1996.
- FUNNELL, L.³, MARSH, T.³, and THOMAS, M.O.J., 'Strategies for Integrating Computers into Mathematics Lessons - Emphasising Spreadsheets', *SAME papers*, Waikato University, New Zealand, 223-238, 1995.
- TEE, G.J., 'Interesting encounter', *CHANCE* 9 (No.2) p. 26, 1996. (Reprinted from School of Mathematical and Information Sciences Newsletter t, page 16, 1995.)
- TEE, G.J., 'Meteorites in Antarctic icebergs?', *METEORITE!* 2 (2), p. 27, 1996.
- TEE, G.J., 'William Moses Feldman, historian of rabbinical mathematics and astronomy', *The New Zealand Mathematics Magazine* 33 (2), 60-62, 1996. (Reprinted from The Australian Mathematical Society Gazette 22, 178-180, 1995.)
- THOMAS, M.O.J., 'Two Major Difficulties For Secondary Algebra Students Constructing Mathematical Thinking', *SAME papers*, Waikato University, New Zealand, 239-259, 1995.

3. OTHER MATTERS RELATED TO RESEARCH ACTIVITIES

Diploma, Honours and Masters Students in the Mathematics Department

Name	Thesis Topic/Title	Supervisor(s)
Anne Buzeika	Statistics and Mathematics	Dr Bill Barton
Bryce Cattell	A Mathematical Language Intervention Programme	Maxine Pfannkuch
Henry Chan	Hong Kong and New Zealand Maths Learning	Dr Bill Barton
Ivy Chan	Partial Differential Equations	Dr Steve Taylor
Edward Clark	Bayesian Conductance Imaging	Drs Colin Fox & Geoff Nicholls
Alison Cochrane	Calculators in Primary Mathematics	Dr Michael Thomas
Marcia Daniels	Changing Maths Anxiety	Dr Bill Barton
Kelvin Hartnall	The AFT and Fourier Paradigm of Brain Action	Dr Wayne Walker
Yu-Fei (Fay) Huang	Sylow Numbers and Sylow Graphs for ${}^2F_4(q^2)$	Dr Jianbei An
Yu-Fei (Fay) Huang	Recent results on the four colour theorem	Dr Paul Bonnington
Christine Kiernan	Graphic calculators in algebra teaching	Dr Michael Thomas
Alistair Kwan	Geometric Optics and Knot Theory	Prof. David Gauld, Dr Graeme Putt, (Physics) & Garry Tee
Emily Lane	Switching in Heteroclinic Networks	Dr Vivien Kirk
Elliot Lawes	Sylow Structures for $G_2(q)$	Dr Jianbei An
Elliot Lawes	Studies in algebraic topology	Prof. David Gauld
Nicholas Lee	Exact Sampling MCMC	Dr Geoff Nicholls
Shane Legg	Inference and Complexity	Dr Cristian Calude (Computer Science)
Steven Littlewood	Ratio and the Van Hieck levels	Dr Michael Thomas
Puvanendran Mailvaganam	Wavelets	Dr Wayne Walker
Puvanendran Mailvaganam	Advanced Measure Theory and Applications	Dr Ganesh Dixit
Ann Mintram	Reading course on Logarithmic Spirals	Garry Tee
Svetlana Mitrovic	Maths Education in former Yugoslavia	Dr Bill Barton
Greg Oates	Quantity and Quality Research Decisions	Dr Bill Barton
Shaunagh O'Halloran	Graphics Calculus Follow-up Study	Dr Bill Barton
Eivor Oines	Numerical studies of Hamiltonian problems	Dr Robert Chan
Louise Parsons	Simulated Patch Selection of Grazing Animals	Dr Vivien Kirk
Saidur Rahman	Explicit Runge-Kutta methods for DDEs	Dr Philip Sharp
Diane Shearer	Children's Perception of Mathematics as they progress through Primary School	Maxine Pfannkuch
Benjamin So	Fractal Image Compression	Dr Joel Schiff
Julie Stewart	Mathematical Progress of Third Form Students	Maxine Pfannkuch
Steven Taylor	Studies in probability and operations research	Dr Wiremu Solomon
Sanja Todorovic-Vasiljevic	Sylow Numbers and Sylow Graphs for $3D_4(q)$	Dr Jianbei An
Sanja Todorovic-Vasiljevic	Residually finite groups	Prof. Marston Conder

Simon Toon	Computers and functional understanding	Dr Michael Thomas
Matthew Tearle	The Double Hopf Bifurcation	Dr Vivien Kirk
Christine Turner	Billing Students Learning Maths	Dr Bill Barton
Ieuan Wickham	Fertilizer Strategy Models	Prof. Graeme Wake
Shinji Yamamoto	Age-structured models in epidemiology	Prof. Graeme Wake

PhD Students in Mathematics or Mathematics Education

Name	Thesis Topic/Title	Supervisor(s)
Britta Basse	Population Dynamics of Threatened Species	Prof. Graeme Wake & Dr John McLennan (Landcare)
Jiling Cao	Topology	Prof. Ivan Reilly & A/Prof. M.K. Vamanamurthy
Tina Chan	Numerical Analysis	Prof. John Butcher
David Chen	Numerical Analysis	Prof. John Butcher
Peter Dobcsanyi	Combinatorial computation using distributed processing	Prof. Marston Conder & A/Prof. Peter Gibbons (CompSci)
Grant Emms	Active Control of Periodic Noise	Dr Colin Fox
Rose Gong	Combustion of Wet Materials	Prof. Graeme Wake & Dr John Burnell (IRL)
Mark Harmer	Differential equations	Prof. Boris Pavlov & Dr Colin Fox
Christopher Heath	Modular Representations of Finite Groups	Dr Jianbei An
Gareth Hegarty	Boundary Control of Nonlinear Partial Differential Equations	Dr Steve Taylor
Ye Yoon Hong	Proceptual Understanding of Calculus	Dr Mike Thomas & Prof. Ivan Reilly
Peter Johnston	Numerical Analysis	Prof. John Butcher
Rowan Killip	Spectral properties of thin channel	Prof. Boris Pavlov & Dr Wayne Walker
Susan Kopetschny	Soil quality and sustainability	Prof. Graeme Wake & Dr Ken Louie (AgResearch)
Saraswathi Kota	Affective Factors and Algebra Problem Solving	Dr Mike Thomas & Prof. Ivan Reilly
John MacCormick	Asymptotics of Kac-Szego Determinants	Prof. Boris Pavlov & Dr Wayne Walker
Ying Mai	Numerical solutions of nonlinear evolutionary problems	Prof. John Butcher & Dr Philip Sharp
Barbara Miller-Reilly	Affective change in adult students returning to mathematics	Dr Margaret Morton, Dr Mike Thomas, & Dr Constance Brown (Stats)
Abdul Mohamad	Topology	Prof. David Gauld
John Pearson	Metrisation theorems Graph Theory, Combinatorics	& Dr David McIntyre Dr Paul Bonnington, Prof. Marston Conder & Prof. Peter Lorimer
Kerry Richardson	Topology	Prof. David Gauld
Anjana Singh	Resolutions	& Dr David McIntyre
Brian van Dam	Numerical Analysis	Prof. John Butcher
	Resolutions	Prof. David Gauld
Cameron Walker	Vertex-transitive graphs	& A/Prof. M.K. Vamanamurthy
Rachel Weir	Complex dynamical systems	Prof. Marston Conder
Tsukasa Yashiro	Immersion of 3-manifolds	Prof. Gaven Martin
		Prof. Gaven Martin & Dr Tim Marshall

Research Students in Other Departments

Name	Thesis Topic/Title	Supervisor(s)
Hyuck Chung (MSc Physics)	Conductance Imaging	Dr Colin Fox
Nathaniel de Lautour (PhD Physics)	Mathematical Acoustics	Dr Colin Fox
Mike Flemming (MSc Physics)	Acoustics	Dr Colin Fox
Julia Kim (PhD Massey U)	Functional Differential Equations	Prof. Graeme Wake
Colleen McMurchy-Pilkington	Maori Women in Mathematics	Dr Bill Barton
Guinevere Nalder (PhD Engineering)	Flow in Curved Channels	Prof. Graeme Wake

Tessa Philips (MSc Physics)	Acoustics	Dr Colin Fox
Mark Poletti (PhD Acoustics)	Assisted Reverberation Systems	Dr Colin Fox
Antony van Dyk (PhD Massey U)	Corrosion under Paint Films	Dr Alex McNabb and Prof. Graeme Wake
Ian Whaley (PhD Physics)	Aurilisation	Dr Colin Fox
Lara Wilcocks (MSc Physics)	Sea/Ice interaction	Dr Colin Fox

Research Fellows

Name	Affiliation
Dr Sergei Fedorov	Marsden Fund Postdoctoral Fellow
Sina Greenwood	Department Research Fellow
Dr Tim Marshall	Marsden Fund Postdoctoral Fellow
Dr Alex McNabb	Marsden Fund Research Fellow
Dr Michael Meylan	NZ Science & Technology Postdoctoral Fellow
Dr Warren Moors	NZ Science & Technology Postdoctoral Fellow
Dr Andrew Retszov	Honorary Research Fellow
Dr Stuart Scott	Honorary Research Fellow
Dr Tatiana Soboleva	Honorary Research Fellow
Dr Kumar Vetharanim	AgResearch Postdoctoral Fellow
Dr Mark Wilson	NZ Science & Technology Postdoctoral Fellow
Dr Simon Woodward	AgResearch Research Fellow

Visitors

Name	Affiliation
Prof. Brian Alspach	Simon Fraser University, BC, Canada
Prof. Dan Archdeacon	University of Vermont, USA
Prof. Kari Astala	University of Jyvaskyla, Finland
Easwaran Balakrishnan	Massey University
Dr Brian Bowditch	University of Southampton
Prof. Jim Cannon	Brigham Young University, Utah, USA
Prof. Fan Chung	University of Pennsylvania
Prof. Tamas Erdelyi	Texas A&M University, USA
Dr Paul Gartside	University of Oxford, UK
Prof. John Giles	University of Newcastle, Australia
Prof. Chris Godsil	University of Waterloo, Ontario, Canada
Alan Graham	Open University, UK
Dr Ron Graham	AT&T Bell Research Laboratories, USA
Prof. Mikhail Gromov	IHES, Paris, France
Prof. Kathy Heinrich	Simon Fraser University, BC, Canada
Bridget Jones (RSNZ Teaching Fellow)	Parua Bay School, Northland
Dr Cathy Kessell	University of California, Berkeley, USA
Dr Robin Knight	University of Oxford, UK
Prof. Gilah Leder	La Trobe University, Melbourne, Australia
Dr Aisling McCluskey	University College Galway, Ireland
Dr Mark McGuinness	Victoria University of Wellington
Prof. Kevin McLeod	University of Wisconsin, Milwaukee, USA
Einar Magerøy	Norwegian Technical University, Trondheim, Norway
Erik Nilsen	Norwegian Technical University, Trondheim, Norway
Eivor Øines	Norwegian Technical University, Trondheim, Norway
Assoc. Prof. Vladimir Pestov	Victoria University of Wellington
Prof. Qazi Ibadur Rahman	Université de Montreal, Canada
Prof. Rosemary Renaut	Arizona State University, USA
Prof. Gary Roach	University of Strathclyde, UK
Prof. Bob Russell	Simon Fraser University, BC, Canada
Prof. Jiang Shouli	Shandong University, Jinan, Shandong, PR China
Prof. Zibgniew Slodkowski	University of Chicago, USA
Prof. Steve Smith	University of Illinois (Chicago), USA

Seminars by Visitors and Honorary Research Fellows

In addition to numerous internal seminars given by members of the Department on their research, the following seminars were given by visitors and honorary research fellows:

Prof. Ron Dunkley (University of Waterloo, Canada)
Good output requires good input

Liz Stone (Auckland College of Education)
Assessment in secondary school mathematics: A British perspective

Prof. Tony Michel (University of Notre Dame)
Associative memories via artificial feedback neural networks

Prof. Leonard Scott (University of Virginia)
High weight theory: old and new

Prof. Douglas Munn (University of Glasgow)
Special involutions

Prof. Odo Diekmann (Utrecht University, The Netherlands)
Reflections on epidemic models triggered by the case of Phocine Distemper Virus among seals

Dr Grant Lythe (Universite Libre de Bruxelles)
Stochastic dynamics and lasers

Dr Andrew Begg (University of Waikato)
Mathematics curriculum: looking ahead

Dr Christine Mynhardt (University of South Africa)
Chessboard covering problems

Prof. Ernie Cockayne (University of Victoria, BC)
Non-redundant queens on $n \times n$ chessboards

Dr Paul Gartside (University of Oxford)
Set theoretic methods in topology

Assoc. Prof. Don Nield (Engineering Science)
Modelling flow in porous media

Prof. Dan Archdeacon (University of Vermont)
Sewing ribbons on graphs in space

Tony Sears (James Cook High School)
A bulletin board service for mathematics teachers?

Prof. John Howie C.B.E. (University of St Andrews, Scotland)
*Infinite semigroups of transformations, and
The place of mathematics in education: recent initiatives in Scotland*

Dr David Tan (University of Cambridge)
Fluids research: spacecraft destabilisation and atmospheric modelling

Prof. Bob Russell (Simon Fraser University, BC)
*Adaptive numerical methods for solving PDEs and their applications
A moving mesh strategy for solving higher dimensional PDEs*

Assoc. Prof. Gordon Knight (Massey University, Albany Campus)
Critical factors in the implementation of the new mathematics curriculum

Dr Kumar Vetharaniam (Ag Research Postdoctoral Fellow)
Mathematical modelling of animal growth

Dr Andrew Reztsov (Honorary Research Fellow, Tamaki Campus)
A method for construction of cubature formulae for integration and use in mathematical modelling

Dr Shaun Cooper (Massey University, Albany Campus)
*The q -binomial theorem and other identities
The Macdonald identities and some extensions*

Prof. Thomas Kaijser (Linköping University, Sweden)
On stochastic perturbations of iterations of circle maps

Dr Brett Collins (Marketing Department)
An improved customer retention model

Barbara Burns (Howick College)
*A case study of Asian students' and their New Zealand teachers' perceptions of mathematics
and the New Zealand mathematics classroom*

Dr Alexei Boiarkine (Auckland)
Combinatorial algebra and combinatorial geometry

Grant Emms (Acoustics Research Centre)
*Control of sound transmission through an aperture using active sound absorption techniques:
a theoretical investigation*

Prof. Q.I. Rahman (Université de Montreal)
*Zeros of complex polynomials
On a polynomial inequality of Erdős related to that of Bernstein*

Jim Neyland (Victoria University of Wellington)
Dialogical reasoning in the mathematics classroom

Prof. Steve Smith (University of Illinois at Chicago)

Subgroup complexes
Prof. John Giles (University of Newcastle, Australia)
A differentiability characterisation of Banach spaces not containing l_1

Prof. Mikhael Gromov (I.H.E.S., Paris)
The geometry of groups

Prof. James Cannon (Brigham Young University)
Squaring rectangles: a discrete Riemann mapping theorem
Recognising Kleinian groups combinatorially

Prof. Tamas Erdelyi (Texas A&M University)
Littlewood-type problems on polynomials with $(-1,0,1)$ coefficients

Prof. Don Kreher (Michigan Technological University)
Hunting t -Designs with $t > 3$

Prof. Elemer Rosinger (University of Pretoria)
Algebraic and order completion methods for solving nonlinear PDEs, and a solution to Hilbert's Fifth Problem

Prof. Len Bos (University of Calgary)
Kergin Interpolation

Prof. Zbigniew Slodkowski (University of Illinois, Chicago)
Holomorphic motions and Evolution of subsets of C^2

Dr Francis Thio (Massey University, Albany Campus)
Plasmas and controlled thermonuclear fusion

Dr Stuart Scott (Hon. Research Fellow)
Topology and near-rings (3 seminars)

Dr Roger Bryant (UMIST, UK)
Finite groups acting on free Lie algebras

Prof. Don James (Pennsylvania State University)
Bianchi groups and integral quadratic forms

Prof. Kevin McLeod (University of Wisconsin, Milwaukee)
Radially symmetric solutions of semilinear elliptic equations

Dr Michael Meylan (University of Otago)
Wave induced vibration of floating thin plates by a variational method

Dr Edward Bierstone
Resolution of singularities

Catherine Sulem (University of Toronto)
The non-linear Schroedinger equation and related systems

Prof. Chris Godsil (Waterloo, Canada)
Cospectral graphs and isometric modules

Prof. Isaac Namioka (University of Washington, Seattle)
Separate and joint continuity: a survey

Dr Vladimir Pestov (Victoria University, Wellington)
On free actions, minimal flows, and a problem by Ellis

Dr Mark McGuinness (Victoria University, Wellington)
Heat pipes in geothermal reservoirs

Dr Shaun Cooper (Massey University, Albany Campus)
Some generalisations of Euler's beta integral and Jacobi's triple product identity

Dr Tony Pleasants (AgResearch, Whatwhata)
Agriculture and mathematics: the interface

Prof. Jose Ventura (Pennsylvania State)
Tight upper bounds on optimal broadcast networks

Mac McKenzie (UNITEC)
Mathematics in Context

Dr Gillian Thornley, Aldis Lecturer (Massey University)
From Descartes to Aldis and beyond: A geometrical history

Prof. Cathy Kessel (University of California, Berkeley)
Teaching Mathematical Problem Solving: An analysis of an emergent classroom community

Dr Andrew Pullan (Engineering Science Department)
Modelling electrical activity from heart to body surface

Prof. Ernie Kalnins (University of Waikato)
 q -algebras, special functions and Kronecker products

Prof. Winfried Kohnen (University of Heidelberg, Germany)
Elliptic curves and modular forms

Gregor Lomas (Auckland College of Education)
Developments in mathematics education at ACE

Prof. Jiang Shouli (Shandong University, China)
A problem and its partial solution

Prof. Gary Roach (Strathclyde University, UK)
Iterative Techniques for potential problems
An introduction to Scattering Theory
Aspects of nonlinear scattering theory
Scattering theories involving moving boundaries

Prof. Valerie Isham, NZMS Visiting Lecturer (University College, London)
Epidemics: Models for the spread of infection and the development of disease

Bridget Jones (Royal Society Teacher Fellow)
Report on technology use in the primary classroom

Alan Graham (Open University, UK)
Open Calculator Challenge programme for secondary schools

Prof. Gilah Leder (La Trobe University, Melbourne)
Women as an Influence in Mathematics Education

Prof. Frank Harary (New Mexico State University)
Ramsey theory for graphs

Dr Sze Tan (Physics Department)
Entangled Physics: Quantum Cryptography and Computation

Eivor Øines (University of Trondheim, Norway)
Stiffness

Dr Stephen Joe (University of Waikato)
Numerical Multiple Integration - The Lattice Way

Dr Chris Tindle (Physics Department)
Wavefronts in underwater sound

Dr Jozef Siran (Slovak Technical University, Bratislava)
Cayley maps

Prof. Brian Alspach (Simon Fraser University, BC)
Isomorphisms of Cayley graphs

Research Grants

During the year the following new or continuing research grants were awarded to members of the Department:

MARSDEN FUND GRANTS

Prof. J.C. Butcher	Innovative numerical methods for ordinary differential equation (\$37,000)
Prof. M.D.E. Conder	Combinatorial Methods in Mathematics & Applications (\$28,000)
Prof. D.B. Gauld	The theory of non-metrisable manifolds (\$28,222)
Prof. V.F.R. Jones	Interactions between mathematical physics, topology & group theory (\$30,244)
Prof. G.J. Martin	Dynamical systems & discrete groups (\$71,666)
Prof. B. Pavlov	Geometry of Hilbert space and spectral theory of nonselfadjoint operators (\$107,444)
Prof. G.C. Wake and Dr A. McNabb	Mathematical methods of heat and mass transfer (\$74,000)

AUCKLAND UNIVERSITY STAFF RESEARCH GRANTS

Dr J. An	Alperin's weight conjecture (\$2000)
Dr W. Barton	Open University LINK Research (\$2370)
Dr C. Fox	Laboratory Reproduction of Acoustic Experiences (\$9000)
Prof. D. Gauld	Manifolds near the limit of metrisability (\$6000)
Dr V. Kirk	Noise and Heteroclinic Networks (\$2250)
B. Miller-Reilly	Affective change in adult students returning to study Mathematics (\$1700)
Dr M. Morton	Infinite graphs (\$2200)
Dr G. Nicholls	Complex stochastic spatial processes (\$4000)
Dr G. Nicholls	Complex stochastic spatial processes (\$7950)
Dr A. Slinko	Algebraic testing theory (\$3000)
Dr M. Thomas	Algebra thinking processes of primary students (\$5000)
A/P M. Vamanamurthy	Conformal invariants and quasiconformal mappings (\$581)

AUCKLAND UNIVERSITY GRADUATE RESEARCH GRANTS

Ye Yoon Hong	Promoting Conceptual understanding of the calculus of Riemann integrals (\$2000)
Saraswathi Kota	Algebraic problem solving and Affective factors (\$2200)
Abdul Mohamad	On generalized metric spaces and applications to manifolds (\$2200)

Kerry Richardson Resolutions (\$2200)

AUCKLAND UNIVERSITY RESEARCH INFRASTRUCTURE GRANTS

Dr D. McIntyre et al Network Upgrade for Mathematics and Statistics (\$33,000)
Dr P. Sharp et al Computer Workstation Network (\$35,000)
Prof. G. Wake et al Computer Workstation Network (\$60,000)

IV. STAFF LEAVE AND CONFERENCES

* Invited lectures

David Alcorn New Zealand Mathematics Colloquium, Massey University (July)

Dr Jianbei An Beijing International Symposium on Group Theory, Beijing (May)
New Zealand Mathematics Colloquium, Massey University (July)
RIMS Conference on Groups and Combinatorics, Kyoto, Japan (December) *
Representations of Algebras, Chiba University, Japan (December) *

Dr Bill Barton British Society Research and Learning Mathematics, Loughborough, UK (May)
Swedish Teachers Conference, Mullsjo, Sweden (June)
8th International Congress of Mathematics Education, Seville, Spain (July) *

Prof. Marston Conder New Zealand Mathematics Colloquium, Massey University (July)
International Conference on Geometric Group Theory, ANU, Canberra (July) *
Mini-conference on Discrete Mathematics, Logic and Theoretical Computer
Science, VU Wellington (December) *
DMTCS'96 (Inaugural Conference of the Centre for Discrete Mathematics
and Theoretical Computer Science), University of Auckland (December)

Dr Paul Bonnington 22nd Australasian Conference on Combinatorial Mathematics and
Combinatorial Computing, Sydney (July)
DMTCS'96 (Inaugural Conference of the Centre for Discrete Mathematics
and Theoretical Computer Science), University of Auckland (December)

Prof. John Butcher Study & Research Leave, first semester
Volterra Centennial Conference, Arizona State University (May)
New Zealand Mathematics Colloquium, Massey University (July)

Dr Bruce Calvert Study & Research Leave, whole year
Mathematical Theory of Networks and Systems '96, Missouri, USA (June)
Second World Congress of Nonlinear Analysts, Athens, Greece (July)

Dr Ganesh Dixit New Zealand Mathematics Colloquium, Massey University (July)

Dr Colin Fox New Zealand Mathematics Colloquium, Massey University (July) *

Prof. David Gauld Quality in Post Graduate Education, Adelaide (April)
New Zealand Mathematics Colloquium, Massey University (July)

Dr Paul Hafner New Zealand Mathematics Colloquium, Massey University (July)
DMTCS'96 (Inaugural Conference of the Centre for Discrete Mathematics
and Theoretical Computer Science), University of Auckland (December)

Dr Andrew Hill New Zealand Mathematics Colloquium, Massey University (July)

Dr Vivien Kirk Study & Research Leave, first semester
32nd Australian New Zealand Industrial and Applied Mathematics
Conference, Masterton (February)
Mathematics Methods in Nonlinear Optics, University of Notre Dame (April)
New Zealand Mathematics Colloquium, Palmerston North (July)
Celebrating Constructive Change: Women as an influence in mathematics
education, University of Auckland (November)

Dr Norman Levenberg On leave for whole year
Swedish Mathematical Society Meeting, Umea, Sweden (June) *

Dr David McIntyre Study & Research Leave, second semester

	New Zealand Mathematics Colloquium, Massey University (July) Toposym '96 (8th Prague Topology Symposium), Prague (August)
Prof. Gaven Martin	Conference on Conformal Geometry, Trondheim, Norway (May) * Swedish Mathematical Society Meeting, Umea, Sweden (June) * New Zealand Mathematics Colloquium, Massey University (July) International Conference on Geometric Group Theory, ANU, Canberra (July) *
Dr Alex McNabb	New Zealand Mathematics Colloquium, Massey University (July) Conference on Mathematics and Computers in Sport, Gold Coast (October) *
Barbara Miller-Reilly	Adults Learning Mathematics Conference, Brighton, UK (July) 8th International Congress on Mathematical Education, Seville, Spain (July) Celebrating Constructive Change: Women as an influence in mathematics education, University of Auckland (November) Research on Gender in Science, Mathematics and Technology, Wellington (November)
Dr Warren Moors	25th Spring Conference of the Union of Bulgarian Mathematicians, Kazanlak, Bulgaria (April) *
Dr Margaret Morton	Study & Research Leave, first semester Joint AMS/MAA meeting, Orlando, USA (January) Beijing International Symposium on Group Theory, Beijing (May) 22nd Australasian Conference on Combinatorial Mathematics and Combinatorial Computing, Sydney (July) Research on Gender in Science, Mathematics and Technology, Wellington (November) Celebrating Constructive Change: Women as an influence in mathematics education, University of Auckland (November)
Prof. Boris Pavlov	Australian New Zealand Industrial and Applied Mathematics Conference, Masterton (February), Quantum Mechanics and Stochasticity, Les Treilles, France (July) Topics in Operators Theory, Vienna, Austria (July)
Maxine Pfannkuch	NZ Statistical Association Conference, Wellington (August) NZ Association for Research in Education Conference, Nelson (December)
Prof. Ivan Reilly	10th Summer School on Real Functions Theory, Slovakia (September) *
Dr. Arkadii Slinko	Jordan Algebras Conference, Oberwolfach, Germany (February)
Moirá Statham	Sixth Bridging Mathematics Network Conference, Adelaide (July)
Roy Swenson	New Zealand Mathematics Colloquium, Massey University (July)
Dr Steve Taylor	Joint Mathematics Meetings (AMS, MAA, etc), Orlando (January) 32nd Australian New Zealand Industrial and Applied Mathematics Conference, Masterton (February)
Garry Tee	32nd Australian New Zealand Industrial and Applied Mathematics Conference, Masterton (February) Australian Mathematical Society Meeting, Flinders University (June) New Zealand Mathematics Colloquium, Massey University (July)
Dr Mike Thomas Australasia, Melbourne (July)	19th Conference of the Mathematics Education Research Group of Mathematics Education Lecturers Association Conference, Melbourne (July)
A/Prof. Vamanamurthy	New Zealand Mathematics Colloquium, Massey University (July)
Prof. Graeme Wake	32nd Australian New Zealand Industrial and Applied Mathematics Conference, Masterton (February) New Zealand Mathematics Colloquium, Massey University (July) Workshop on Plankton Population Dynamics, Isaac Newton Institute, Cambridge, UK (August)
Dr Mark Wilson	International Ring Theory Conference, Miskolc, Hungary (July)

American Mathematical Society Special Session in Non commutative
Algebra, Pasadena, USA (November)

In addition several staff and graduate students contributed significantly to the organisation of conferences, notably the Mathematics Summer Workshop at Tolaga Bay in January, the 32nd Australian New Zealand Industrial and Applied Mathematics Conference at Masterton in February, the one-day symposium Celebrating Constructive Change held at Auckland in November, and the Inaugural Conference of the Centre for Discrete Mathematics and Theoretical Computer Science at Auckland in December.

V. COMMUNITY SERVICES

In 1996 staff of the Mathematics Department continued to make contributions at various levels to the teaching and research programmes in other Departments and Faculties within the University, served on University and Faculty committees and as conveners of Standing Committees of the Board of Studies for the Mathematical and Information Sciences.

Staff regularly provide professional advice to the public and scientific community. Often this advice is routine and given free of charge (as a valuable public relations exercise), while in other cases this advice can be quite involved, requiring much skill and expertise. Also members of staff continue to contribute in many ways to the success of professional societies, as members of their executives and conveners of special committees, and on the editorial boards and as referees of international mathematics journals.

Dr Bill Barton was Bevan Werry Memorial Speaker for 1995/96 and spoke at five regional Mathematics teachers association meetings on "Unit Standards" and also visited the Open University (UK) as a British Council visitor under their LINK scheme.

Prof. John Butcher has very kindly donated to the University of Allahabad (India) part of his personal library consisting of copies of Mathematical Reviews and some other books and periodicals. These have been supplemented by other staff donations as part of an initiative by Dr Ganesh Dixit, and shipped to India with financial support from the Dean of Science, Prof. Ralph Cooney. Also John Butcher was appointed as Guest Editor to a special issue of the journal Applied Numerical Mathematics, to celebrate the centenary of the 1895 paper by Carl Runge (which formulated what is now known as the Runge-Kutta method). This 400-page publication (consisting of 24 papers by a total of 45 authors) appeared in November 1996.

Prof. Marston Conder has been appointed by the Minister of Research, Science & Technology to the Marsden Fund Committee, and now convenes the Marsden Fund advisory panel for the Mathematical & Information Sciences, of which Prof. John Butcher is also a member. Marston Conder was also appointed by the Foundation for Research, Science & Technology to its Advisory Committee for New Zealand Science & Technology Postdoctoral Fellowships, and by the Ministry of Research, Science & Technology as a "lead expert" in the mathematical sciences to help coordinate the production of a profile of New Zealand's scientific knowledge base. Professors John Butcher, David Gauld and Graeme Wake made contributions as area profile authors in that exercise.

Dr Colin Fox appeared in a screening of the final programme "Refining the View" in the Open University/BBC Education TV series "Seeing through Mathematics" during the year. This 30-minute programme was made as part of the Open University's new foundation course in mathematical modelling, and has a large N.Z. component featuring interviews with Colin about his research conducted on the sea-ice off Antarctica, and including items on the construction of bamboo scaffolding in Hong Kong, monitoring the survival rate of the Hector's dolphin population, and the fluctuation in the water-level of Lake Wakatipu. The first programme had an audience of over half a million when screened in the U.K. in February.

Prof. David Gauld has been serving as the University's Assistant Vice-Chancellor (Research) for the last two years, chairing the Auckland University Research Committee and sitting on several other committees (while at the same time supervising numerous graduate students).

Retired Associate Professor Gordon Hookings has been running a National Certificate course for advanced school students, from which the top twenty students each year are invited to attend a camp for the NZ Mathematical Olympiad team selection. Also Prof. Ivan Reilly and Dr Arkadii Slinko are both closely involved in the NZ Mathematical Olympiad movement.

Dr Alex McNabb (Marsden Fund Research Fellow) gave an address to the Mathematics and Computers in Sport conference at Bond University in September, describing the applications of mathematics to gymnastics — a sport in which he was several times NZ champion (see The Australian, Oct 2, 1996).

Dr Vivien Kirk has been elected to the Council of the NZ Mathematical Society, replacing Marston Conder who has served 10 years on the NZMS Council (including the last four years as Vice-President and President).

Dr Margaret Morton, together with colleagues from Waikato and Massey Universities, is setting up a research project to investigate factors affecting doctoral study in mathematics in New Zealand Universities. This survey will help provide data for prospective graduate students, give insight into the problems faced by current doctoral students, and provide information for the mathematical community. The research group is particularly interested in whether gender is a critical factor in the recruitment and subsequent experience of graduate students in mathematics.

Prof. Ivan Reilly has been serving as Director of the School of Mathematical and Information Sciences, and also Head of the Mathematics Education Unit. During the year he organised several forums for ideas on teaching and on research grant applications.

Garry Tee was asked during the year to assist with an interesting piece of mathematical detective work: calculating the site of Charles Kingsford-Smith's fatal plane crash off the coast of Burma in 1937. In August Garry gave some lectures in the first half of a graduate level paper in the History of Computing, in which he told the students about Bletchley Park, and the design and construction in 1943 of the electronic machine COLOSSUS for decryption of secret communications, which is now acknowledged as the first computer to operate. At the end of his lecture he introduced Mrs Catherine Caughey, one of the operators of COLOSSUS, who then spoke to a class of very appreciative students.

Prof. Graeme Wake is engaged in a number of dynamical systems modelling projects with industrial clients and research institutes, dealing with a range of agricultural and ecological processes and chemical engineering. Also Graeme has served as convener of the Royal Society of New Zealand's standing committee on mathematical and information sciences, and chair of the Australia and New Zealand Industrial and Applied Mathematics group (ANZIAM).

VI. OTHER MATTERS

Staffing

Prof. Marston Conder has become Head of Department, for a 3-year term from December 1995. Sabrina Young and Esther McCondach have joined the secretarial office. A former student Andrew Hill was appointed to a Temporary Lectureship following completion of his PhD thesis at the University of Canterbury, and several new PhD students were appointed as Assistant Lecturers and Temporary Tutors.

There were over 130 candidates for a vacant lectureship (caused by the retirement of Ken Ashton who died a few months later) advertised early in the year, and following interviews in July the position was offered to Dr Eamonn O'Brien, who will take up his appointment in February 1997. His research interests lie in group theory and computational algebra. Also a half-time Temporary Lectureship was advertised for someone to assist the Department's involvement in the University's new teacher education programme in 1997, and this was offered to Judy Patterson (of the Senior College of New Zealand).

The following academic staff were successful in their applications for promotion:

Assoc. Prof. M.K. Vamanamurthy	Within Associate Professor scale
Dr Joel Schiff	Over the bar in Senior Lecturer scale
Dr Bill Barton	To Senior Lecturer
Dr Mike Thomas	To Senior Lecturer
Dr Paul Bonnington	Double increment in Lecturer scale
Pam Hurst	To Senior Tutor.

During the year Bill Barton completed his PhD on Ethnomathematics: Exploring Cultural Diversity in Mathematics (under the supervision of Prof. Jim Marshall, Education). Prof. Graeme Wake gave his inaugural lecture as Professor of Industrial and Applied Mathematics to a gathering of 150 colleagues and guests of the University on 2 October. Entitled HITECH ANGLES, this focussed on the role of mathematics in applications and some implications for the teaching of mathematics.

On 22 October the Department honoured one of its senior members by celebrating the Shashtipurti (approximately 60th birthday) of Dr Ganesh Dixit. This celebration took the form of a symposium of short lectures (including a guest lecture by the President of the NZ Mathematical Society, Prof. Douglas Bridges) followed by an evening meal. Ganesh is known for his work in mathematical analysis, especially in summability theory, and served the international mathematical community for many years as the editor of the Indian Journal of Mathematics.

On 29 November another member of the Department was similarly honoured with a day-long seminar on "Celebrating Constructive Change" for mathematics teachers and educators. This seminar was held as a tribute to Jill Ellis who retired at the end of the year after many years service to mathematics education, particularly furthering the interests of women and girls in mathematics as a foundation member of the EQUALS Network.

Department Administration

Many staff members have made substantial contributions to the effective administration of the Department. Thanks are especially due to the Department Assistant (Bev Grove) and all the general staff, Denise Albert and Marian Alford and other staff of SMIS, and to the following staff who have key responsibilities in the Department:

Head of Department's Advisory Group	Prof. John Butcher, Prof. David Gauld, Dr Vivien Kirk
Head of Applied & Computational Maths Unit	Dr Philip Sharp
Head of Mathematics Education Unit	Prof. Ivan Reilly
Director of Graduate Studies	Dr Wayne Walker
Research Coordinator	Prof. John Butcher
Teaching Coordinator	Dr Margaret Morton
Computing Services	Dr David McIntyre, Dr Philip Sharp, Dr Mike Thomas
BTech (Industrial Maths) Programme Coordinator	Prof. Graeme Wake
Enrolment Coordinator	Dr David Smith
Timetable Administrator	Chris King
Examinations Coordinator	Chris King
Publicity Officer	Dr Bill Barton
Regulations/Handbooks	Dr David Smith
NZ Mathematical Society Correspondent	Garry Tee
Webmaster	Dr Mark Wilson
Overseas Students & Ad Eundum Admissions	Dr Joel Schiff
Library Liaison Officer	David Alcorn
Convenor of Staff/Student Liaison Committee	Greg Oates
Lab Demonstrators Coordinator	John Pemberton
Markers Coordinator	Roy Swenson
Department Research Report Series	Olita Moala
Seminars:	
Algebra, Geometry & Combinatorics	Dr Mark Wilson
Analysis	Dr Warren Moors
Applied, Computational & Industrial Maths	Dr Vivien Kirk & Prof. Graeme Wake
Mathematics Education	Maxine Pfannkuch
Topology	Prof. David Gauld & Dr David McIntyre
Lunchtime mini-seminars	Prof. John Butcher
Tamaki seminars	Dr Steve Taylor
Faculty Representatives:	
Arts	David Alcorn
Commerce	Dr Joel Schiff
Engineering	Dr Geoff Nicholls

New Zealand Journal of Mathematics

The New Zealand Journal of Mathematics is jointly produced by the Department and the New Zealand Mathematical Society, with Editorial staff consisting of Prof. John Butcher (Editor), Dr Joel Schiff (Managing Editor), Dr Jianbei An (Associate Editor), Esther McCondach (Editorial Assistant), and Betty Fong (Production Assistant). Two issues of Volume 25 (Numbers 1 and 2) of the NZJM were published during the year. Members of Department on the Editorial Board are Professors Marston Conder, Vaughan Jones, Gaven Martin and Graeme Wake, and the Department's representatives on the Management Committee are David Alcorn (who is also convenor of the Committee) and Prof. Ivan Reilly.

VII. OVERALL COMMENTS ON WORK AND PROGRESS WITHIN THE DEPARTMENT

The Department is actively pursuing the broad aims set out in the University's "2001: Missions, Goals and Strategies" document, encouraging a high quality environment for teaching and learning, continuing to undertake world class research in several areas, and attracting and supporting an increasing percentage of postgraduate students. Our ability to achieve these aims is however being severely hampered by a relatively low level of resourcing, particularly in terms of shortage of office accommodation and desk space (for staff, visiting researchers and postgraduate students), and a lack of adequate tutorial and computer laboratory facilities for undergraduate students.

I wish to record my gratitude to staff of the Department and SMIS for their assistance and cooperation through the year.

Prof. Marston Conder
Head of Department of Mathematics