

CENTRE FOR DISCRETE MATHEMATICS AND COMPUTING

in the
DEPARTMENT OF MATHEMATICS
and the
DEPARTMENT OF COMPUTER SCIENCE AND ELECTRICAL ENGINEERING
at
THE UNIVERSITY OF QUEENSLAND

INTERIM REPORT

March 2000

This Centre was formed at the beginning of 1998 by the merger of the Centre for Combinatorics (in the Department of Mathematics) with the Algorithms Group (in the Department of Computer Science and Electrical Engineering). It is thus a Category 2 Centre, aiming to promote research in combinatorics (a University Priority Research Area since 1993) and in algorithm design (part of Computer Science, an area of Institutional Strength).

Theoretical interests within the Centre include designs and finite geometries, networks and graphs, universal algebras and their relation to designs and graphs, number theory, finite fields, combinatorial computing, algorithm development relevant to these areas and to linear algebra, and parallel and distributed computing. Applications of particular interest include experimental design, error-correcting codes and cryptography, techniques for combinatorial chemistry and DNA sequencing, and the production of scientific software now included in such large systems as MAGMA (based at the University of Sydney), GAP (Scotland), LIDIA and KANT (Germany) and PARI (France).

The Centre acts as a national base for an international body, the Institute of Combinatorics and its Applications, and as a regional base for the Combinatorial Mathematics Society of Australasia (Incorporated) for which it publishes an international journal, the *Australasian Journal of Combinatorics*. Members of the Centre actively collaborate with research groups in Belgium, Canada, China, Germany, Italy, United Kingdom and the United States of America, and (within Australia) at the University of Sydney, the University of Technology, Sydney, the Australian National University, the University of Western Australia, the University of Adelaide and the University of Wollongong. They maintain a Number Theory website. The Centre is one of the fourteen groups listed on the World Combinatorics Exchange: <http://www.combinatorics.org/ejc-wce.html>

This report describes the recent and current research activities of staff and postgraduate students now associated with the Centre, many of whom were already working in the area before the Centre was formally established.

Prospective postgraduate students should consult Professor J.A. Eccleston, Head of the Department of Mathematics (phone (07)3365-2673), or Professor P.A. Bailes, Head of the Department of Computer Science and Electrical Engineering (phone (07)3365-3869), for details of higher degree rules and of scholarships, awards and fellowships available in mathematics and in computer science and electrical engineering, respectively, and Professor Anne Street (phone (07)3365-3279; email aps@maths.uq.edu.au) for further information with regard to the Centre.

For information on undergraduate courses in discrete mathematics and computing, see Associate Professor Elizabeth Billington (Mathematics, phone (07)3365-2313; email ejb@maths.uq.edu.au) or Associate Professor George Havas (Computer Science and Electrical Engineering, phone (07) 3365-2904; email havas@csee.uq.edu.au).

See also the Centre Web page: <http://www.it.uq.edu.au/~havas/cdmc.html>

1. STAFF ASSOCIATED WITH THE CENTRE

Honorary Professor and Centre Director

Anne Penfold Street, MSc *Melb*, PhD *Ill*, DMath *Wat* FTICA, (*combinatorial designs*).

Honorary Professor

Charles Curtis Lindner¹, BS *Pres, Clinton, S.C*, MS, PhD *Emory*, FTICA, (*combinatorial designs*).

Readers

Elizabeth Jane Billington, MA, DipAdMaths *Oxon*, DipEd, PhD, FTICA, FAustMS, (*combinatorial designs*).

George Havas, BA (hons) *ANU*, PhD *Sydney*, (*algorithm design*).

Senior Lecturers

Diane Margaret Donovan, BA, DipEd *La Trobe*, PhD, FTICA, (*combinatorial designs and computer security schemes*).

Keith Robert Matthews, MSc, PhD, (*number theory*).

Neil Hale Williams, BSc, PhD *ANU*, (*logic and set theory*).

Lecturers

Peter Adams, BSc (hons), BComm, PhD, AFTICA, (*combinatorial designs and combinatorial computing*).

Kevin Eugene Gates, BS *USCGA*, MS, PhD *UWa*, (*algorithm development in linear algebra*).

Kenneth Raward Gray², BA (hons), DipEd *Macquarie*, PhD, FTICA, (*combinatorial designs and mathematics education*).

Barry Denis Jones, MSc *Tas*, PhD *Exe*, MTICA, (*algebra*).

Abdollah Khodkar³, MSc *Sharif*, PhD, (*combinatorial designs*).

Australian Postdoctoral Research Fellow

Nicholas Ahti Hamilton, BSc (hons), PhD *UWA*, (*finite geometry*).

Research Fellow

Darryn Edward Bryant, BSc, MScSt, PhD, FTICA, (*combinatorics, algebra, DNA sequencing, combinatorial chemistry*).

Research Officers

Robert Coulter, BSc (hons) *Flinders*, PhD, (*algorithms and applications in finite fields*).

Gregory Gamble, BSc (Computing), BE (Elec), MMath *UNSW*, PhD *UWA*, (*combinatorial algorithms*).

Colin Ramsay, BCompSci, BSc (hons) *NTU*, PhD, (*combinatorial computing and algorithm development*).

Honorary Research Advisers

Martin James Sharry⁴, BSc (hons), PhD, FTICA, (*combinatorial designs and combinatorial computing*).

Sheila Williams, MA, DPhil *Oxon*, FTICA, (*universal algebra and combinatorial designs*).

Visiting Research Staff

Marie Henderson⁵, BSc (hons) *Flinders*, PhD, (*algorithms and applications in finite fields*).

Ebadollah S Mahmoodian⁶, BS *Tehran*, MS *Shiraz*, AM, PhD *Pennsylvania*, FTICA, (*combinatorial designs*).

¹Distinguished Professor, Auburn University

²Honorary Research Adviser; lecturer (p/t); Test Constructor (p/t), Queensland Board of Senior Secondary School Studies

³Research Officer (p/t); lecturer (p/t)

⁴Manager (Infrastructure Services), Information Technology Branch, Department of Families, Youth and Community Care, Queensland

⁵Research Scientist, DSTO

⁶Professor of Mathematical Sciences, Sharif University of Technology, Tehran, Iran

2. RESEARCH STUDENTS

The lists include thesis titles and the names of the relevant research supervisors.

1997

Marie Henderson (PhD, *Several classes of polynomials over finite fields*, Havas).
 S A M Makki (PhD, *Efficient distributed solutions for classical network problems*, Havas).
 Anthony Terence Moran, (PhD, *Block designs and their defining sets*, Street).

1998

Robert Coulter (PhD, *Planar functions and related topics in finite fields*, Havas).
 Brenton Donald Gray, (PhD, *Trades and defining sets with applications to access schemes*, Street).
 Adelle Maree Howse, (PhD, *Latin interchanges, critical sets and associated structures*, Donovan).
 Colin Ramsay (PhD, *Trades and defining sets: theoretical and computational results*, Havas/Street).

1999

Nicholas J Cavenagh, (MSc, *Graph decompositions of complete tripartite graphs using trades*, Billington).
 Phillip Michael Hawkes, (PhD, *A Markov approach to cryptanalysis of ciphers*, Donovan/Luke O'Connor (IBM Zurich)).
 Barbara Marguerite Maenhaut (PhD, *Substructures of cycle systems with applications to access schemes*, Street/Sharry).
 Marks Richard Nester, (PhD, *Mathematical investigations of some plant interaction designs*, Street/Matthews).
 Sarah Zahrai (PhD, *Varieties of universal algebras generated by finite algebras*, S Williams).

Current

Richard W Bean, (PhD, *Latin squares, critical sets and related structures*, Donovan/Billington).
 Andrew D Blinco, (PhD, *Topics in graph decomposition and design theory*, Billington).
 Sean M Byrnes, (PhD, *Applications of combinatorics in drug design*, Bryant/M Smythe (Drug Design and Development)).
 Nicholas J Cavenagh, (PhD, *Latin cubes*, Donovan/Billington/Khodkar).
 Mark Griffin, (PhD, *Homotopy, an innovative method for the analysis of randomly oriented magnetic resonance spectra*, Gates/G R Hanson/K Burrage).
 Karen Grace Harris, (PhD, *Combinatorial designs, intersection problems and graph decompositions*, Billington/Donovan).
 Andrew Janke, (PhD, *Image manipulation in molecular resonance imaging*, Gates/G Galloway).
 Julie Lindsay Lawrence, (PhD, *Algorithms for combinatorial computing*, Havas/Street).
 Stephen M Long, (PhD, *Combinatorial methods and applications in drug discovery*, Adams/Tran Trung Tran (Drug Design and Development)).
 Annette Masters, (PhD, *Extensions to support vector machines*, Gates/T Downs (Computer Science and Electrical Engineering)).
 Anthony Rasmussen, (PhD, *High performance computational modelling in molecular reaction dynamics*, S C Smith/Gates).

3. VISITORS

1997

Professor D G Hoffman (Auburn University, Auburn, Alabama), January, *Quality funds*; and June–July, *Ethel Raybould Visiting Fellow*.
 Professor J–P Seifert (University of Frankfurt), February–March.
 Prof J von zur Gathen (Universitaet Paderborn), March.
 Professor Saad El-Zanati (Illinois State University), May–June.
 Professor James Hirschfeld (University of Sussex), August–September.
 Dr P Kenne (University of Adelaide), August.
 Professor C C Lindner (Auburn University, Auburn, Alabama), August–September.
 Professor M F Newman (Australian National University), November.
 Professor R A Mathon (University of Toronto), November–December.

1998

Professor Aiden Bruen (University of Western Ontario), March.
 Professor Joel Spencer (Courant Institute, New York), April.
 Professor Peter Eades (University of Newcastle), April.
 Professor Rosemary Bailey (Queen Mary and Westfield College), 23ACCMCC.
 Professor Peter Cameron (Queen Mary and Westfield College), 23ACCMCC.
 Professor Chin-Mei Fu (Tamkang University), July–August, 23ACCMCC.
 Professor Hung-Lin Fu (National Chiao-Tung University) July–August, 23ACCMCC.

Professor Zicheng (Jason) Gao (Carleton University), 23ACCMCC.
 Professor Jovan Golic (University of Belgrade), 23ACCMCC.
 Professor Derek Holton (University of Otago), 23ACCMCC.
 Professor Curt Lindner (Auburn University), June–July, 23ACCMCC.
 Professor Ebadollah Mahmoodian (Sharif University of Technology), Raybould Fellow, June–July, 23ACCMCC.
 Professor Winfried Muller (Klagenfurt, Austria), 23ACCMCC.
 Dr Christine O’Keefe (University of Adelaide), 23ACCMCC.
 Professor Alexander Rosa (McMaster University), 23ACCMCC.
 Professor Igor Shparlinski (Macquarie University), August.
 Professor Michael Newman (Australian National University), September.
 Professor Saad El-Zanati (Illinois State University), September–December.
 Professor R A Mathon (University of Toronto), November–December.

1999

Professor Michael Atkinson (University of St Andrews), January.
 Professor R G Burns (York University), October–November.
 Professor J W P Hirschfeld (University of Sussex), August–September.
 Professor C C Lindner (Auburn University), June–July.
 Professor Ebadollah Mahmoodian (Sharif University of Technology), August–December, Combinatorics Workshop.
 Professor R A Mathon (University of Toronto), November–December.
 Professor P M Neumann (Oxford University), February–March.
 Dr Christine O’Keefe (University of Gent/University of Adelaide), November, Combinatorics Workshop.
 Dr Timothy Penttila (University of Western Australia), November, Combinatorics Workshop.
 Professor Christopher Rodger (Auburn University), November, Raybould Fellow, Combinatorics Workshop.
 Dr Igor Shparlinski (Macquarie University), May.
 Professor R G Stanton (University of Manitoba), March–April.

2000

Professor Frank De Clerck (Universiteit Gent), January.
 Mario Delanote (Universiteit Gent), January.
 Professor D G Hoffman (Auburn University, Auburn, Alabama), March.
 Professor C C Lindner (Auburn University, Auburn, Alabama), November (planned).
 Professor J R Seberry (University of Wollongong), January.

4. RESEARCH

Combinatorial Designs: construction, properties and classification.

Ternary designs, existence and properties. Designs as graph decompositions. Trades in graphs. Intersection problems for designs. Blocking sets in designs. Metamorphosis of designs, including G -designs. Partitioning families of blocks into collections of disjoint designs, including collections of small planes. Bipartite and tripartite designs; cycle systems and Hamilton/Waterloo problems. Defining sets of designs and critical sets of Latin squares; trades and Latin interchanges. Defining sets of other combinatorial structures.

Designs for application.

Applications of designs to authentication schemes, to the construction of access schemes for computer security and to the construction of block ciphers. Classes of designs for the study of plant competition.

Finite Geometry.

Construction, characterisation and embedding problems associated with geometric structures in finite projective spaces. Links between areas such as polar spaces, finite group theory, structures in projective planes, partial geometries and designs. Construction of distance regular covers of complete graphs using sets in finite projective spaces. Relations between strong Steiner trades and projective planes; m -systems of polar spaces; hyperovals in projective planes.

Combinatorial Designs: relationships with universal algebras.

Relationships between quasigroups and certain types of neighbourhood designs; when the particular quasigroups involved actually form a variety. Minimal distances of group Latin squares. Universal algebra techniques applied to construct new designs. Small 2-perfect designs. Strongly 2-perfect cycle systems and associated quasigroups.

Other Applications of Combinatorics.

Encoding/decoding methods for combinatorial chemistry. DNA sequencing techniques using hybridization methods. Optimization of combinatorial chemistry methods.

Infinite Combinatorics.

Combinatorial properties of infinite sets.

Algebra.

Ramsey varieties of finite groups, the topological group of p -adic integers, varieties of congruence lattices of groups. Homological algebra and ring theory. Cohomology rings of finite groups.

Computing canonical forms of matrices.

LLL lattice basis reduction; its applications to finding small multipliers for the extended gcd problem and, more generally, to finding small unimodular transformation matrices for the Hermite Normal form of an integer matrix.

Algorithm Design.

Abstract algebraic algorithms. Perfect hashing. Fundamental algorithms for parallel and distributed systems. Finite fields and their applications. Computational combinatorics. Algorithm development for linear algebra.

5. REPORTS ON CONFERENCES

THE TWENTY-THIRD AUSTRALASIAN CONFERENCE ON COMBINATORIAL MATHEMATICS AND COMBINATORIAL COMPUTING, QUEENSLAND, 6–10 JULY 1998

The 23ACCMCC was held in Brisbane from 6 to 10 July 1998. On the Monday, Thursday and Friday, talks were held at The University of Queensland St Lucia campus; on the Tuesday at Queensland University of Technology Gardens Point campus; on the Wednesday morning at Jupiters Casino, 100km south at the Gold Coast, in a joint session with the 14th Australian Statistical Conference. There were 83 participants from 16 different countries. The conference included 10 invited lectures, and 52 contributed talks in parallel sessions.

Travel on the Tuesday to QUT was via the Citycat, a fast catamaran ride down the river from St Lucia. The conference outing on the Wednesday afternoon was to the Currumbin Wildlife Sanctuary at the Gold Coast. The conference dinner was held at the Staff and Graduates Club at UQ on the Thursday evening. Other social events were the registration with wine and cheese on the Sunday night, and a cocktail party on the Monday evening. The morning and afternoon teas were also memorable.

The AGM of the ICA was held on the Thursday morning, at which the 1996 Hall Medal was presented to Christos Koukouvinos. The AGM of the Combinatorial Mathematics Society of Australasia Inc. (CMSA) was also held later on the Thursday. The CMSA now has a web page; see <http://www.math.fsc.qut.edu.au/cmsa>. Professor Anne Street has stepped down as President; the new President of the CMSA is Professor Derek Holton, University of Otago, New Zealand.

The following papers were presented at the conference. Invited lectures are indicated by a bullet, and in the case of multiple authors, the name that appears first in the list is the name of the presenter.

- R.A. Bailey *Partitions and resolved designs*
- A. Baliga *Self-dual codes from D_{4t} -cocyclic Hadamard matrices*
- Lynn Batten *Blocking semiovals*
- Sheng Bau *Minimum number of components of a 2-factor in cubic graphs*
- F.E. Bennett *Recent results on $(v, 6, 1)$ -perfect Mendelsohn designs*
- Matthew R. Brown *A geometrical characterisation using graph theory*
- Peter J. Cameron *Some bridges between codes and designs*
- A. Carmona, E. Bendito and A.M. Encinas *A characterization of strongly-regular graphs from a potential theory perspective*
- Nicholas J. Cavenagh and Elizabeth J. Billington *Decompositions of complete tripartite graphs into 5-cycles*
- Bob Clarke, Guo-Niu Han and Jiang Zeng *A new Mahonian statistic related to derangements*
- P.C. Denny and P.B. Gibbons *Case studies and new results in combinatorial enumeration*
- Diane Donovan and Adelle Howse *Towards the spectrum of critical sets*
- Yoshimi Egawa *k -shredders in k -connected graphs*
- Carolyn Eschenbach *How many negative entries can a square sign pattern matrix have?*
- Chin-Mei Fu and Yuang-Chern Se *A large set of latin squares with two fixed entries in common*
- Hung-Lin Fu *The maximum genus of a graph with given diameter and connectivity*
- Greg Gamble and Cheryl E. Praeger *Vertex-primitive groups and graphs of order twice the product of two distinct odd primes*
- Zhicheng Gao *Diagonal flips in planar triangulations*
- J. Gimbert *On digraphs with unique walks of length $k - 1$ or k between vertices*
- Michael Giudici and Cheryl E. Praeger *Completely transitive codes in the Hamming graphs*
- David G. Glynn *On projective planes of prime order, Veronesians, and codes (preliminary report)*
- Jovan Dj. Golić *Some combinatorial aspects of stream cipher analysis*
- Nicholas Hamilton and Catherine Quinn *m -systems of polar space and maximal arcs in projective planes*

- J.W.P. Hirschfeld *Maximal curves over a finite field*
 •Derek Holton *All the nice graphs and hamiltonicity*
 Peter Horák *Decomposing STS's into small configurations*
 J.A. John, Emlyn R. Williams and David Whitaker *CycDesigN: future directions*
 A. Khodkar and Peter Adams *Smallest critical sets for the latin squares of orders six and seven*
 C. Koukouvinos, M. Mitrouli and Jennifer Seberry *New orthogonal designs in order 36*
 Julie Lawrence *Computational techniques for finding smallest defining sets of some discrete structures*
 Felix Lazebnik *On a class of algebraically defined graphs*
 Paulette Lieby and Mirka Miller *Antichains and their volumes*
 •C.C. Lindner *A mirthful romp through the history of embedding partial even-cycle systems*
 C.H.C. Little *The principal edge bipartition of a graph*
 Barbara Maenhaut *Constructing m-cycle trades*
 Ebadollah S. Mahmoodian *Defining sets of vertex coloring in regular graphs*
 William Millan, Andrew Clark and Ed Dawson *Applying genetic algorithms to cryptography*
 M. Mitrouli, C. Koukouvinos and Jennifer Seberry *Pivot size in Gaussian elimination for some classes of optimal matrices*
 J.W. Moon, Lane Clark and A. Meir *On the Steiner distance of trees from certain families*
 •Winfried B. Müller *Commutative polynomial permutations in cryptography; possibilities and limitations*
 Lauren Nielsen, Ed Dawson and Gary Carter *A branch-and-bound search implementation for cryptanalysis of DESI*
 Graham Norton and Tim Blackmore
Generalized Reed-Muller codes via a matrix-based generalization of the $(u|u+v)$ construction
 Alan Offer *Ovoids of generalized hexagons*
 •Christine O'Keefe *Some graphs, codes and designs from geometry*
 Michael Raines *A generalization of the Doyen-Wilson theorem for extended triple systems of all indices*
 H. Robalewska *Non-standard random walks on graphs*
 Ian Roberts and Oudone Phanalasy *Minimal separating systems and minimal completely separating systems*
 C.A. Rodger and Erin E. Spicer *$K_4 - e$ designs with no subsystem*
 •Alex Rosa *Symmetric graph designs*
 Jennifer Seberry and Kenneth Russell *The minimal critical set of a class of Youden squares*
 Deborah J. Street *Resolvable designs for resolving disputes*
 Anne Penfold Street *Defining sets of large and overlarge sets of designs*
 Jayme L. Szwarcfiter *Results and problems on clique graphs*
 D.E. Taylor, R.B. Howlett and L.J. Rylands *Computing in the natural modules of finite groups of Lie type*
 Kazuhiko Ushio *\tilde{S}_k -factorization of symmetric complete tripartite digraphs*
 Akshay Venkatesh *Coverings and symmetric graphs*
 Ian Wanless *Latin squares with no proper subsquares*
 Sheila Oates-Williams and Darryn E. Bryant *Strongly 2-perfect trail systems and related quasigroups*
 Alan R. Woods *Unsatisfiable systems of equations, over a finite field*
 N.C. Wormald and W.D. Smith *Geometric separator theorems and applications*
 Sarah Zahrai *Single law for extended cycle systems*
 Sanming Zhou, Cai Heng Li and Cheryl E. Praeger *On a family of imprimitive symmetric graphs*

COMBINATORICS WORKSHOP, NOVEMBER, 1999

The Centre held a small workshop from 2 to 5 November 1999, with one day devoted to geometries, one to coding theory and cryptography, and two to design theory, graph decompositions and other combinatorics. Financial assistance from the UQ Department of Mathematics is gratefully acknowledged. Early on the Tuesday afternoon we had the obligatory pause for the Melbourne Cup, and on the Friday evening a survivors' party was held. There were 18 talks presented.

- Peter Adams *Computational Methods in combinatorics*
 Richard Bean *On the size of the largest critical set in a Latin square*
 Elizabeth Billington *Decompositions of complete tripartite graphs into gregarious 4-cycles*
 Matthew Brown *The Coney Island project: spreads of the $GQ T_2(O)$*
 Darryn Bryant *Very small embeddings of some partial triple systems*
 Linda Burnett *Evolutionary heuristics for finding cryptographically Strong S-Boxes*
 Bob Buttsworth *Edge and path operators on vertex functions*
 Gary Carter *An overview of methods for generation of elliptic curve cryptosystems*
 Ed Dawson *Methods for designing Boolean functions for cryptographic applications*
 Diane Donovan *Direct products and Latin interchanges*
 Rodney Downey *Parametric analysis of fundamental problems in coding theory*
 Nicholas Hamilton *Existence and non-existence of m-systems of polar spaces*
 Abdollah Khodkar *On minimal defining sets for the Steiner triple systems from affine geometry $AG(d, 3)$*
 Ebad Mahmoodian *Defining sets of graph colourings*
 Christine O'Keefe *On the magic action of $PGL(2, q)$ and automorphisms of generalized quadrangles*
 Tim Penttala *Generalised quadrangles, translation planes and flocks of cones*
 Phil Pollett *On the evolution of some random graphs*
 Chris Rodger *Some 4-cycle decompositions: removing trees/cycles etc*

Drs Donovan and Khodkar presented 35 hours of research seminars at a workshop held at Ramkhamhaeng University, Bangkok, Thailand, in February, 1999. The workshop dealt with block designs, cryptology and coding theory.

6. RECENT AND CURRENT FUNDING

Associate Professor Billington and Dr Adams

Automated code generation, parallel algorithms, and a certain type of graph decomposition, \$16 500, University of Queensland Enabling grant, 1999.

Associate Professor Billington, Drs Bryant and Adams

Trades in graphs, \$165 000, ARC, 1997–9.

Dr Bryant

Large sets of cycle systems and related designs, Australian Postdoctoral Research Fellowship, (supervisor Professor Street), \$164 348, ARC, 1996–8.

With Dr P M Diamond (Department of Mathematics) and N Kuznetsov (Russian Academy of Science), *Statistical laws for computational collapse of chaotic systems*, \$160 000, ARC, 1997–9.

Embedding cycle systems of multigraphs, \$14 600, The University of Queensland New Staff Research Grant Scheme, 1998.

With Dr M Trau (Department of Chemistry), *Rapid DNA sequencing by hybridization of a patterned colloidal array*, \$165 000, ARC, 1998–2000.

Combinatorial graph decomposition techniques and DNA sequencing by hybridization, \$60 000, University of Queensland Foundation Research Excellence Award, 1999–2000.

Dr Bryant and Dr Adams

Parallel algorithms and computational techniques in combinatorial design theory, \$116 000, ARC, 1995–7.

Dr Donovan

The spectrum of critical sets, \$20 000, ARC, 1999.

Promoting Women's Fellowship, \$8 333, The University of Queensland, 2000 (January – June).

Dr Gates

With Dr G R Hanson (Centre for Magnetic Resonance), *Comparison of honotopy and least-squares fitting for the computation of resonant field values for randomly oriented paramagnetic spectra*, \$16 576, University of Queensland New Staff Grant, 1998.

With Dr G R Hanson (Centre for Magnetic Resonance) and Professor K Burrage, *Application of virtual reality for visualisation and algorithmic development in magnetic resonance*, \$25 000, ARC, 1998.

With Dr G R Hanson (Centre for Magnetic Resonance) and Professor K Burrage, *Development of an interactive computer simulation/visualisation software environment for the analysis of randomly oriented ESEEM and pulsed ENDOR spectra*, \$248 000, ARC, 1997–9.

With Professor T Downs (Department of Computer Science and Electrical Engineering), *Some extensions to Support Vector Machines*, \$150 000, ARC, 1998–2000.

Dr Hamilton

Maximal arcs, partial geometries and designs, Australian Postdoctoral Research Fellowship, (supervisor Associate Professor Billington), \$166 845, ARC, 1997–9.

Associate Professor Havas

Computing with finitely presented groups, \$168 000, ARC, 1998–2000.

Algorithms and applications in finite fields, \$150 000, ARC, 1998–2000.

Professor Street

With Professor J R Seberry (Department of Computer Science, University of Wollongong), *Access schemes and data protection schemes for computer security from families of combinatorial designs*, \$178 000, ARC, 1995–7.

With Professor J R Seberry (Centre for Computer Security Research, Department of Computer Science, University of Wollongong), *Access schemes and data protection schemes for computer security and electronic strongboxes from combinatorial structures*, \$156 000, ARC, 1998–2000.

Professor Street, Dr Donovan and Dr Adams

Enhanced computer security from inter-relations between combinatorial structures, \$165 000, ARC, 1999–2001.

Professor Street and Associate Professor Havas

Combinatorial algorithms, \$10 000, Round 3 Quality money, 1996–7.

Algorithms for combinatorial computation, \$150 000, ARC, 1997–9.

7. INVITATIONS

The following staff associated with the Centre have given invited talks outside the department, since 1997.

Associate Professor Billington.

Invited speaker, *Decomposing multipartite graphs into cycles*, Department of Discrete and Statistical Sciences, Auburn University, Alabama, USA, October, 1997.

Invited speaker, *4-cycles: a survey of results*, Department of Mathematics, Memorial University, St John's, Newfoundland, Canada, July, 1999.

Invited speaker, *Some simple graph decompositions*, Advanced Graduate Summer School in Discrete and Statistical Sciences, Auburn University, Alabama, USA, August, 1999.

Invited speaker, *A survey of results on 4-cycles*, Department of Discrete and Statistical Sciences, Auburn University, Alabama, USA, September, 1999.

Three talks in series on 4-cycle and related systems:; *The metamorphosis of 4-wheel systems into 4-cycles and into bowties: Gregarious tripartite 4-cycle systems; A survey of 4-cycle results*, University of Catania, January, 2000.

Dr Bryant

Invited speaker, Third International Conference on Combinatorial Mathematics and Combinatorial Computing, Melbourne, July, 1997.

Invited speaker, *More results on the Oberwolfach problem*, Department of Mathematics, University of Illinois, Illinois, USA, October 1997.

Invited speaker, *Varieties of m-cycle systems*, Department of Mathematics, University of Illinois, Illinois, USA, March 1999.

Invited speaker, *Combinatorial aspects of DNA sequencing by hybridization*, Department of Mathematics and Department of Biological Sciences, Illinois State University, Illinois, USA, April 1999.

Invited speaker, *Very small embeddings of partial Steiner triple systems*, Open University, Milton Keynes, UK.

Invited speaker, Pacific Institute for the Mathematical Sciences, Workshop on Graph Decompositions, Simon Fraser University, June, 2000 (planned).

Dr Donovan

Invited speaker, *Completing partial Latin squares*, 24th Australasian Conference on Combinatorial Mathematics and Combinatorial Computing, Darwin, July 1999.

Dr Hamilton

Invited speaker, *Baer partitions of projective planes*, Department of Mathematics, Università degli Studi di Roma 'La Sapienza' (May 1998).

Associate Professor Havas

Invited Speaker, Euroconference "Computational Methods for Representations of Groups and Algebras", Essen, Germany (April 1997).

Theoretical Computer Science Seminar speaker, Fachbereich Mathematik-Informatik, Universität-GH Paderborn, Germany (April 1997).

Seminar speaker, Department of Discrete and Statistical Sciences, Auburn University, USA (April 1997).

Invited Speaker, Dagstuhl: Computational methods for permutation and matrix groups, Internationales Begegnungs- und Forschungszentrum fuer Informatik, Schloss Dagstuhl, Germany (May 1997).

Invited Speaker, Oberwolfach: Computational Group Theory, Mathematisches Forschungsinstitut Oberwolfach, Germany (June 1997).

Gastprofessor and Seminar Speaker, Institut fuer Experimentelle Mathematik, Universität Essen, Germany (June 1997).

Seminar speaker, Informatik, Universität Kassel, Germany (June 1997).

Conference Speaker, International Conference on Parallel and Distributed Processing Techniques and Applications (PDPTA'97), Las Vegas, USA (July 1997).

Conference Speaker, Eighth Australasian Workshop on Combinatorial Algorithms, Noosa (July 1997).

Seminar speaker, Macquarie University (September 1997).

Conference Speaker, The Fourth Annual Australasian Conference on Parallel And Real-Time Systems, University of Newcastle (September 1997).

Seminar speaker, Newcastle University (October 1997).

Invited speaker, Fourth CANT Conference - CANT'97, Sydney University (Dec 1997).

Invited speaker, DIMACS Workshop on Randomization Methods in Algorithm Design, Princeton University (December 1997).

Seminar speaker, University of Chile (December 1997).

Seminar speaker, Northeastern University, Boston (June 1998).

Seminar speaker, Sun Research Labs, Sunnyvale (July 1998).

Invited speaker, Workshop on Computational and Geometric Aspects of Modern Algebra, Heriot-Watt University, Edinburgh (July 1998).

Seminar speaker, Beijing University (August 1998).

Invited speaker, Workshop on Distributed High Performance Computing and Gigabit Wide Area Networks, Essen (Aug-Sep 1998).

Invited speaker, 18th International Conference on Distributed Computing Systems, Amsterdam (May 1998).

Invited speaker, 3rd Asian Symposium on Computer Mathematics, Lanzhou University, China (August 1998).

Invited speaker, *Groups and Computation*, The Ohio State University (June 1999).

Invited speaker, Symposium on Computation in Group Theory and Geometry, July 1999, The Mathematics Institute, University of Warwick, Coventry, England.

Invited speaker, Research Seminar Groups, Combinatorics and Computer Science, Department of Mathematical Sciences, University of Oulu, Finland, August 1999.

Invited speaker, Group Theory and Computation, November–December 1999, University of Sydney.

Conference speaker, 30th Southeastern International Conference on Combinatorics, Graph Theory, Computing, Florida Atlantic University, Boca Raton, Florida, March 1999.

Conference speaker, Fifth Annual International Computing and Combinatorics Conference, July 1999, Tokyo, Japan.

Dr Khodkar

Invited speaker, *On Alspach's conjecture with two even cycle lengths*, Illinois State University (October, 1997).

Invited speaker, *On Alspach's conjecture with two even cycle lengths*, University of Illinois (October, 1997).

Dr Matthews

Invited speaker, Technische Universität, München, August, 1997.

Invited speaker, University of Kent, Canterbury, September, 1997.

Professor Street

Plenary speaker, *Designs for applications*, Canadian Mathematical Society Annual Conference, University of Manitoba, Winnipeg, Canada, July 1997.

Plenary speaker, *Discrete approaches to mathematical modelling*, Eighth International Conference on the Teaching of Mathematical Modelling and Applications, Brisbane, August 1997.

Invited speaker, Seminar in honour of Professor Peter Lorimer, University of Auckland, November 1997.

Invited speaker, Two talks in series on applications of designs, University of Catania, June 1998.

Invited speaker, Two talks on applications of designs, University of Malaya, February 1999.

Invited speaker, *Access schemes and defining sets of designs*, 24th Australasian Conference on Combinatorial Mathematics and Combinatorial Computing, Darwin, July 1999.

8. HONOURS AND AWARDS

The Institute of Combinatorics and its Applications, an international body, was set up in 1990, based in Canada, with Professor W T Tutte as president and Professor R G Stanton as Registrar. Professor Street is one of the two Australians invited to become Founding Fellows of the ICA and is currently its President; Associate Professor Billington, Drs Donovan and S Williams became Foundation Fellows; Drs Bryant, K Gray, Hamilton and Sharry are Fellows; Drs Adams, Moran and Nester are Associate Fellows; Dr Jones is a Member. Associate Professor Billington is on the ICA Council.

Dr Adams was awarded a 1998 Kirkman Medal of the ICA, for work in combinatorial computing. These medals recognise outstanding achievement by combinatorialists in the early stages of their careers. Dr Adams has worked on developing fast efficient computing techniques for finding graph decompositions. Many combinatorial problems can be solved recursively; often the hardest part of the solution is the construction of the ‘small’ special cases needed to start the recursions and the larger special cases needed to fill ‘gaps’ left by the recursive argument. Dr Adams has developed a *metaprogram* (generic software package) which, given details of any problem, uses automated code generation to produce a second program tailored to the case at hand. This approach allows comparison of search algorithms and the adoption of the most suitable method for solving any specific problem. The success of this approach is shown by the contents of Dr Adams’ thesis, based on 18 of his published papers.

Drs Adams and Bryant received a Research Infrastructure Block Grant for \$67 000 in 2000.

Dr Bryant held an Australian Postdoctoral Research Fellowship from 1996–8.

Dr Bryant was one of seven recipients of the inaugural University of Queensland Foundation Research Excellence Awards in 1999. These awards recognise the outstanding performance and leadership potential of early career researchers. Dr Bryant received a \$60,000 grant for his research project entitled “Combinatorial Graph Decomposition Techniques and DNA Sequencing by Hybridization”. The first aim of the project is to develop novel graph decomposition techniques and use them to provide solutions to numerous open problems in graph theory. The second aspect of the project involves applications of combinatorial mathematics in a new approach to DNA sequencing, namely DNA sequencing by hybridization.

Dr Hamilton holds an Australian Postdoctoral Research Fellowship for 1997–2000. He has been awarded a Research Fellowship at the University of Gent for 2000–2002.

Associate Professor Havas received an award from the Polish National Minister for Education for his contribution to the 147 page monograph "Perfect Hashing" which appeared in the international journal "Theoretical Computer Science" in 1997. The monograph is jointly authored by Havas, Prof Zbigniew Czech of the Institute of Computer Science, Silesia University of Technology and Dr Bohdan Majewski, a PhD graduate of this University. It is one of the outcomes of an international collaboration which came about through Majewski starting his PhD research under the supervision of Czech in Poland and finishing it under Havas at The University of Queensland.

The monograph provides a comprehensive, fundamental study of perfect and minimal perfect hash functions. These have many applications in computing, the best known of which is the dictionary problem. The work provides practical solutions to basic questions and is used by researchers, professionals and teachers in computer science.

Dr Ramsay was placed on the Dean's Commendation List for Outstanding PhD Theses in 1998.

In July, 1999, Professor Street received the inaugural award of the Combinatorial Mathematics Society of Australasia (Inc) for Outstanding Service.

9. PUBLICATIONS AND EDITORSHIPS

The Centre publishes the *Australasian Journal of Combinatorics*, an international journal, for the Combinatorial Mathematics Society of Australasia (Incorporated). Professor Street is Editor-in-Chief and Dr N H Williams is Managing Editor. Associate Professor Billington, Dr Bryant, Dr Donovan, Dr Gray, Associate Professor Havas, Dr Jones and Dr S Williams are Associate Editors, Dr J N Holt (a former member of the Mathematics Department) is a member of the Editorial Board, and Dr Adams is Financial Manager. An international network of combinatorialists is associated with the *Journal*, including Editorial Board members in Canada, New Zealand, USA, Germany and Switzerland, as well as 10 within Australia but outside this university.

The Centre also publishes a Research Report Series, edited by Dr Donovan.

Dr Matthews maintains a World Wide Web site called The Number Theory Web. The site provides links to nearly 500 number theorists' home pages throughout the world, centres, book descriptions, surveys, recent theses, conference information and libraries with good holdings in the number theory field.

CMAT and CALC are exact arithmetic matrix and number theory packages developed by Dr Matthews for use mainly in teaching. For more information see the WWW address <http://www.maths.uq.edu.au/~krm/>

The following staff associated with the Centre have served in other editorial capacities during the period since January 1997.

Associate Professor Billington is an Associate Editor of the *Bulletin of the Australian Mathematical Society* and a member of the Editorial Board of *Utilitas Mathematica*.

Dr Jones is an Associate Editor of the *Bulletin of the Australian Mathematical Society*.

Professor Street is a member of the editorial boards of *Ars Combinatoria*, *Ars Textrina*, *Bulletin of the Institute of Combinatorics and its Applications* and *Scientia Iranica*.

Dr N H Williams is Deputy Editor of the *Bulletin of the Australian Mathematical Society*.

10. COLLABORATION

The following staff members have collaborated in research with people outside the Centre for Discrete Mathematics and Computing during the time since January 1997. The list includes the names and affiliations of all collaborators. Inter-disciplinary collaboration is indicated by an asterisk.

Dr Adams

Professor K Basford*, *School of Land and Food, UQ.*

Professor Saad I El-Zanati, *Department of Mathematics, Illinois State University.*

Professor C Vanden Eynden, *Illinois State University.*

Dr A Galbraith*, *The Prince Charles Hospital.*

Professor D G Hoffman, *Department of Discrete and Statistical Sciences, Auburn University.*

Professor C C Lindner, *Department of Discrete and Statistical Sciences, Auburn University.*

Dr D C McGiffen*, *The Prince Charles Hospital.*

Professor G J McLachlan, *Department of Mathematics, UQ.*

Professor C A Rodger, *Department of Discrete and Statistical Sciences, Auburn University.*

Associate Professor Billington.

Professor Saad I El-Zanati, *Department of Mathematics, Illinois State University.*

Professor Chin-Mei Fu, *Tamkang University, Tamsui, Taipei Shien, Taiwan.*

Professor Hung-Lin Fu, *National Chiao-Tung University, Hsin-Chu, Taiwan.*

Professor M Gionfriddo, *Dipartimento di Matematica, Universita di Catania.*

Professor D G Hoffman, *Department of Discrete and Statistical Sciences, Auburn University.*

Professor D L Kreher, *Department of Mathematical Sciences, Michigan Technological University, Houghton, Michigan.*

Professor C C Lindner, *Department of Discrete and Statistical Sciences, Auburn University.*

Professor Giovanni Lo Faro, *Dipartimento di Matematica, Messina, Italy.*

Professor E S Mahmoodian, *Department of Mathematical Sciences, Sharif University of Technology, Tehran, Iran.*

Dr D A Pike, *Department of Mathematics, Memorial University, St Johns, Newfoundland.*

Professor Gaetano Quattrocchi, *Department of Mathematics, University of Catania, Italy.*

Professor C A Rodger, *Department of Discrete and Statistical Sciences, Auburn University.*

Dr Bryant

Dr B J Battersby*, *Department of Chemistry, The University of Queensland.*

Professor Saad I El-Zanati, *Department of Mathematics, Illinois State University.*

Professor C Vanden Eynden, *Department of Mathematics, Illinois State University.*

Professor Hung-Lin Fu, *National Chiao-Tung University, Hsin-Chu, Taiwan.*

Professor D G Hoffman, *Department of Discrete and Statistical Sciences, Auburn University.*

Professor C C Lindner, *Department of Discrete and Statistical Sciences, Auburn University.*

Professor C A Rodger, *Department of Discrete and Statistical Sciences, Auburn University.*

Dr M Smythe*, *Centre for Drug Design and Development, The University of Queensland.*

Dr T Tran*, *Centre for Drug Design and Development, The University of Queensland.*

Dr M Trau*, *Department of Chemistry, The University of Queensland.*

Dr Donovan.

Dr Joan Cooper*, *Department of Information and Communication Technology, University of Wollongong.*

Dr E P Dawson*, *Information Security Research Centre, Queensland University of Technology.*

Professor D G Hoffman, *Department of Discrete and Statistical Sciences, Auburn University.*

Professor E S Mahmoodian, *Department of Mathematical Sciences, Sharif University of Technology, Tehran, Iran.*

Professor C E Praeger, *Department of Mathematics, University of Western Australia.*

Professor Jennifer Seberry*, *Department of Computer Science, University of Wollongong.*

Dr Gamble

Professor C E Praeger, *Department of Mathematics, University of Western Australia.*

Dr Hamilton

Dr A Blockhuis, *Department of Mathematics, Technische Universiteit Eindhoven and Vrije Universiteit Amsterdam.*

Professor F De Clerck*, *Vakgroep Zuivere Wiskunde en Computeralgebra, Universiteit Gent.*

Professor R Mathon*, *Department of Computer Science, University of Toronto.*

Dr C M O'Keefe*, *Vakgroep Zuivere Wiskunde en Computeralgebra, Universiteit Gent.*

Dr T Penttila, *Department of Mathematics, University of Western Australia.*

Dr I Pinneri, *Dipartimento di Matematica, Universita degli Studi di Roma 'La Sapienza'.*

Dr C Quinn, *Department of Pure Mathematics, University of Adelaide.*

Professor M J de Resmini, *Dipartimento di Matematica, Universita degli Studi di Roma 'La Sapienza'.*

Dr S D Stoichev*, *Department of Computer Science, Technical University, Bulgaria.*

Professor V D Tonchev, *Department of Mathematical Science, Michigan Technological University.*

Dr H Wilbrink, *Department of Mathematics, Technische Universiteit Eindhoven.*

Associate Professor Havas

Professor J-Y Cai, *SUNY Buffalo.*

Dr C M Campbell*, *St Andrews University.*

Professor G Cooperman, *Northeastern University.*

Professor Z J Czech, *Silesia University.*

Dr X G Fang*, *Beijing University.*

Dr S Feisel, *Paderborn University.*

Professor J von zur Gathen, *Paderborn University.*

Dr H W Gollan*, *Essen University.*

Professor D G Hoffman*, *Auburn University.*

Dr D F Holt*, *University of Warwick.*

Dr W Liang, *Australian National University.*

Dr S A Linton, *St Andrews University.*

Dr B Mans, *Macquarie University.*

Dr A Nerurkar, *SUNY Buffalo*.
 Professor M F Newman*, *Australian National University*.
 Dr A C Niemeyer*, *University of Western Australia*.
 Dr E A O'Brien*, *University of Auckland*.
 Dr S E Rees*, *University of Newcastle (UK)*.
 Professor E F Robertson*, *St Andrews University*.
 Professor J-P Seifert, *Frankfurt University*.
 Professor X Shen, *University of Missouri*.
 Dr I Shparlinski, *Macquarie University*.
 Professor C C Sims*, *Rutgers University*.
 Dr L H Soicher*, *University of London*.
 Professor M R Vaughan-Lee*, *Oxford University*.
 Dr C Wagner, *Siegen University*.
 Professor J Wang*, *Beijing University*.
 Professor R A Wilson*, *Birmingham University*.

Dr Khodkar

Professor Saad I El-Zanati, *Department of Mathematics, Illinois State University*.
 Professor D G Hoffman, *Department of Discrete and Statistical Sciences, Auburn University*.
 Professor Hung-Lin Fu, *National Chiao-Tung University, Hsin-Chu, Taiwan*.

Dr Ramsay

Mr I T Roberts*, *Department of Mathematics, Northern Territory University*.

Dr Sharry

Professor D G Hoffman, *Department of Discrete and Statistical Sciences, Auburn University*.
 Professor C C Lindner, *Department of Discrete and Statistical Sciences, Auburn University*.

Professor Street

Professor L M Batten, *Department of Computing Science and Mathematics, Deakin University*.
 Dr Kris Coolsaet, *Department of Mathematics, University of Ghent, Belgium*.
 Professor Chin-Mei Fu, *Tamkang University, Tamsui, Taipei Shien, Taiwan*.
 Professor Hung-Lin Fu, *National Chiao-Tung University, Hsin-Chu, Taiwan*.
 Professor D G Hoffman, *Department of Discrete and Statistical Sciences, Auburn University*.
 Professor C C Lindner, *Department of Discrete and Statistical Sciences, Auburn University*.
 Professor E S Mahmoodian, *Department of Mathematical Sciences, Sharif University of Technology, Tehran, Iran*.
 Professor R Mathon*, *Department of Computer Science, University of Toronto*.
 Professor Jennifer Seberry*, *Department of Computer Science, University of Wollongong*.
 Dr Nasrin Soltankhah, *Department of Mathematics, Azzahra University, Tehran, Iran*.
 Professor R G Stanton*, *Department of Computer Science, The University of Manitoba*.
 Dr Deborah J Street, *Department of Statistics, University of Technology, Sydney*.

Dr S Williams

Professor A M Brunner, *University of Wisconsin-Parkside*.
 Professor R G Burns, *York University, Toronto*.
 Professor Karl H Hoffmann, *Technische Hochschule, Darmstadt*.
 Professor S A Morris, *The University of New England*, (with Dr H B Thompson of this department).
 Dr V N Obraztov, *Kostroma Teachers' Training Institute, Russia*.
 Professor C E Praeger, *Department of Mathematics, University of Western Australia*.
 Professor M R Vaughan-Lee, *University of Oxford*.

REFERENCES

1997

- Peter ADAMS, Elizabeth J BILLINGTON and D G Hoffman, *On the spectrum for $K_{m+2} \setminus K_m$ designs*, *Journal of Combinatorial Designs* **5**, 49–60.
 Peter ADAMS and Darryn E BRYANT, *The spectrum problem for the Heawood graph*, *Bulletin of the Institute of Combinatorics and its Applications* **19**, 17–22.
 Peter ADAMS and Darryn E BRYANT, *i -perfect m -cycle systems, $m \leq 19$* , *Aequationes Mathematicae* **53**, 275–294.
 Peter ADAMS, Darryn E BRYANT, Saad I El-Zanati and Charles Vanden Eynden, *d -cube decompositions of $K_n \setminus K_m$* , *Graphs and Combinatorics* **13**, 1–7.
 Peter ADAMS, Darryn E BRYANT and A KHODKAR, *Uniform 3-factorizations of K_{10}* , *Congressus Numerantium* **127**, 23–32.
 Peter ADAMS, Darryn E BRYANT, A KHODKAR and Saad I El-Zanati, *The intersection problem for cubes*, *Australasian Journal of Combinatorics* **15**, 127–134.
 Lynn Margaret Batten, *Combinatorics of finite geometry*, Cambridge University Press, Cambridge, United Kingdom; second edition, 1997; xiv + 193 pages.

- L M Batten and X Bao, *Equitable colourings in the Witt designs*, Australasian Journal of Combinatorics **16**, 175–181.
- Lynn Margaret Batten, Kris Coolsaet and Anne Penfold STREET (1997), *Blocking sets of pairwise balanced designs with blocks of sizes four and two*, Designs, Codes and Cryptography **10**, 309–314.
- B J BATTERSBY, D E BRYANT and C A Rodger, *Factorizations of complete multigraphs*, Australasian Journal of Combinatorics, Special Issue in memory of Derrick Breach **16**, 35–43.
- Elizabeth J BILLINGTON, *The Petersen graph and black magic?*, Bulletin of the Institute of Combinatorics and its Applications **19**, 125–126.
- Elizabeth J BILLINGTON, Hung-Lin Fu and Chin-Mei Fu, *2-coloring $\{C_3, C_4\}$ -designs*, Bulletin of the Institute of Combinatorics and its Applications **20**, 62–64.
- Elizabeth J BILLINGTON, M Gionfriddo and C C Lindner, *The intersection problem for $K_4 \setminus e$ designs*, Journal of Statistical Planning and Inference, Special Issue in honour of Paul Erdős **58**, 5–27.
- Darryn E BRYANT, *2m-cycle systems of $K_{2m+1} \setminus C_m$* , Graphs and Combinatorics **13**, 227–229.
- Darryn E BRYANT, *On the volume of trades in triple systems*, Australasian Journal of Combinatorics **15**, 16100176.
- Darryn E BRYANT and A KHODKAR, *A census of $(9, 1; 3, 2)$ balanced ternary designs*, Journal of Combinatorial Mathematics and Combinatorial Computing **23**, 153–160.
- Darryn E BRYANT and Sheila OATES-WILLIAMS, *Strongly 2-perfect cycle systems and their quasigroups*, Discrete Mathematics **167/168**, 167–174.
- Darryn E BRYANT, C A Rodger and Erin R Spicer, *Embeddings of m-cycle systems and incomplete m-cycle systems: $m \leq 14$* , Discrete Mathematics **171**, 55–75.
- Gene Cooperman and George HAVAS, *Practical parallel coset enumeration*, Workshop on High Performance Computing and Gigabit Local Area Networks, Lecture Notes in Control and Information Sciences **226**, 15–27.
- R S COULTER and R W Matthews, *Planar functions and planes of Lenz-Barlotti Class II*, Designs, Codes and Cryptography **10**, 165–184.
- R S COULTER and R W Matthews, *Bent polynomials over finite fields*, Bulletin of the Australian Mathematical Society **56**, 429–437.
- Zbigniew J Czech, George HAVAS and Bohdan S MAJEWSKI, *Perfect hashing*, Theoretical Computer Science **182**, 1–143.
- Cathy DELANEY, Brenton D GRAY, Ken GRAY, Barbara M MAENHAUT, Martin J SHARRY and Anne Penfold STREET, *Pointwise defining sets and trade cores*, Australasian Journal of Combinatorics, Special Issue in memory of Derrick Breach **16**, 51–76.
- Diane DONOVAN, *Secretly sharing passwords*, The Australian Mathematics Teacher **53**, 21–25.
- Diane DONOVAN and D G Hoffman, *Critical sets in a family of groups*, Australasian Journal of Combinatorics, Special Issue in memory of Derrick Breach **16**, 21–28.
- Diane DONOVAN, Adelle HOWSE and Peter ADAMS, *A discussion of Latin interchanges*, Journal of Combinatorial Mathematics and Combinatorial Computing **23**, 161–182.
- Diane DONOVAN, Sheila OATES-WILLIAMS and Cheryl E Praeger, *On the distance between group Latin squares*, Journal of Combinatorial Designs **5**, 235–248.
- Xin Gui FANG and George HAVAS, *On the worst-case complexity of integer Gaussian elimination*, ISSAC'97 (Proceedings of the 1997 International Symposium on Symbolic and Algebraic Computation), ACM Press, 28–31.
- K E GATES and W B Gragg, *A note on the rational tqr algorithm*, Journal of Computational and applied Mathematics **86**, 195–203.
- K E GATES, G R Hanson and K Burrage, *Computer simulation of magnetic resonance spectra employing homotopy*; World Wide Patent Application 48552/97.
- K E GATES, S H Robertson, S C Smith, M J Pilling, M S Beasley and K J Maschoff, *Multiple-well isomerization diffusion equation solutions with a shift and invert Lanczos algorithm*, Journal of Physical Chemistry **101**, 5765–5769.
- Rebecca A H GOWER, *Defining sets for the Steiner triple systems from affine spaces*, Journal of Combinatorial Designs **5**, 155–175.
- Brenton D GRAY, *Defining sets of simple designs*, Bulletin of the Institute of Combinatorics and its Applications **19**, 23–26.
- Brenton D GRAY, *Smallest defining sets of designs associated with $PG(d, 2)$* , Australasian Journal of Combinatorics **16**, 87–98.
- Brenton D GRAY, *The maximum number of trades of volume four in a symmetric design*, Utilitas Mathematica **52**, 193–203.
- Brenton D GRAY, Nicholas HAMILTON and Christine M O'Keefe, *On the size of a smallest defining set of $PG(2, q)$* , Bulletin of the Institute of Combinatorics and its Applications **21**, 91–94.
- N HAMILTON, R Nickson, O Traynor and M Utting, *Interpretation and instantiation of theories for reasoning about formal specifications*, Proceedings of the 20th Australasian Computer Science Conference (ACSC'97) **19**, 37–45; Australian Computer Science Communications (February, 1997).
- George HAVAS and Bohdan S MAJEWSKI, *Integer matrix diagonalization*, Journal of Symbolic Computation **24**, 399–408.
- George HAVAS, D G Hoffman and Colin RAMSAY, *Counting trees*, Research on Combinatorial Algorithms (Proceedings of the Eighth Australasian Workshop on Combinatorial Algorithms, AWOCA'97) edited V Estivill-Castro, Queensland University of Technology, Brisbane, pp 1–10.
- M HENDERSON, *A note of the permutation behaviour of the Dickson polynomials of the second kind*, bulletin of the Australian Mathematical Society **56**, 499–505.
- Weifa LIANG, *An NC algorithm for the nearest common dominator problem and related problems in a DAG*, Australian Computer Science Communications, vol 20 (1), Proceedings of the 20th Australasian Computer Science Conference, pp.79–82.
- Weifa LIANG and George HAVAS, *NC approximation algorithms for the 2-connectivity augmentation in a graph*, Proceedings of Euro-Par'97, Lecture Notes in Computer Science, Vol 1300, Springer-Verlag.
- C C Lindner and Anne Penfold STREET, *Multiple minimum coverings of K_n with copies of $K_4 \setminus e$* , Utilitas Mathematica **52**, 223–239.
- S A M MAKKI, *A distributed algorithm for constructing an Eulerian tour*, Proceedings 1997 IEEE International Performance, Computing and Communications Conference, edited J D Carothers, IEEE, Piscataway, New Jersey, pp. 94–100.
- S A M MAKKI and George HAVAS, *An efficient method for constructing a distributed depth-first search tree*, PDPTA'97 (Proceedings of the International Conference on Parallel and Distributed Processing Techniques and Applications), CSREA Press, pp. 660–666.

- Rudolf Mathon and Anne Penfold STREET, *Partitions of sets of designs on seven, eight and nine points*, Journal of Statistical Planning and Inference, Special Issue in honour of Paul Erdős **58**, 135–150.
- Rudolf Mathon and Anne Penfold STREET, *Overlarge sets and partial geometries*, Journal of Geometry **60**, 85–104.
- G Matters, J Pitman and Ken GRAY, *Are Australian boys underachieving? An analysis using a validity–reliability framework based on the work of Lee Cronbach and Pamela Moss*, Proceedings 23rd Annual Conference of the International Association for Educational Assessment, Durban, South Africa, 1997, Queensland Board of Senior Secondary School Studies, pp. 1–22.
- D C McGiffin, A J Galbraith, M F O'Brien, G J McLachlan, D C Naftel, Peter ADAMS, S Reddy and L Early, *An analysis of valve re-replacement following aortic valve replacement with biological devices*, Journal of Thoracic and Cardiovascular Surgery **113**, 311–318.
- Marks R NESTER, *Sequential arrays*, Utilitas Mathematica **51**, 97–117.
- Colin RAMSAY, *On a family of designs whose smallest defining sets have size $b/4$* , Bulletin of the Institute of Combinatorics and its Applications **20**, 91–94.
- Colin RAMSAY, *An algorithm for enumerating trades in designs, with an application to defining sets*, Journal of Combinatorial Mathematics and Combinatorial Computing **24**, 3–31.
- Colin RAMSAY, *An algorithm for completing partials, with an application to the smallest defining sets of the STS(15)*, Utilitas Mathematica **52**, 205–221.
- Colin RAMSAY and Douglas G Rogers, *The problem of irregular perfect systems of sets of iterated differences*, Graphs and Combinatorics **13**, 85–94.
- S H Robertson, K E GATES, S C Smith and M J Pilling, *Application of LDL^T decomposition to two-dimensional master equations*, Journal of Computational Chemistry **18**, 1004–1010.
- X Shen, W LIANG and Q Hu, *Embedding between 2 – D meshes of the same size*, IEEE Transaction on Computers **46** (8), 880–889.
- H Shen and W LIANG, *Efficient enumeration of all minimal separators in a graph*, Theoretical Computer Sciences **180** (1/2), 169–180.
- Anne Penfold STREET and N H WILLIAMS, Australasian Journal of Combinatorics **15**, 302 pages.
- Anne Penfold STREET and N H WILLIAMS, Australasian Journal of Combinatorics **16**, 306 pages.

1998

- Peter ADAMS, Darryn E BRYANT and A KHODKAR, *3,5-cycle decompositions*, Journal of Combinatorial Designs **6**, 91–110.
- Elizabeth J BILLINGTON and D G Hoffman, *The intersection problem for star designs*, Discrete Mathematics **179**, 217–222.
- Elizabeth J BILLINGTON and C C Lindner, *Maximum packings of bowtie designs*, Journal of Combinatorial Mathematics and Combinatorial Computing **27**, 227–249.
- Elizabeth J BILLINGTON and C C LINDNER, *Embedding partial even-cycle systems into resolvable maximum packings*, Journal of Combinatorial Mathematics and Combinatorial Computing **28**, 41–54.
- Elizabeth J BILLINGTON and Giovanni Lo Faro, *Repeated blocks in indecomposable twofold extended triple systems*, Australasian Journal of Combinatorics **18**, 209–218.
- Elizabeth J BILLINGTON and David Pike, *Decomposing block intersection graphs of Steiner triple systems*, Australasian Journal of Combinatorics **18**, 51–64.
- Aart Blokhuis, Nicholas HAMILTON and Henny Wilbrink, *The non-existence of Thas maximal arcs in projective planes of odd order*, European Journal of Combinatorics **19** (4), 413–417.
- Darryn E BRYANT, *Large sets of Hamilton cycle and path decompositions*, Congressus Numerantium **135**, 147–151.
- Darryn E BRYANT, Phil Diamond and I G Vladimirov, *Generalised optimal lattice covering of finite-dimensional Euclidean space*, Linear Algebra and its Applications **282**, 311–324.
- Darryn E BRYANT and A KHODKAR, *On orthogonal double covers of graphs*, Designs, Codes and Cryptography **13**, 103–105.
- Darryn E BRYANT and A KHODKAR, *5-cycle systems of $K_v \setminus F$ with a hole*, Utilitas Mathematica **54**, 59–73.
- Darryn E BRYANT, Hung-Lin Fu and A KHODKAR, *(m, n)-cycle systems*, Journal of Statistical Planning and Inference **74**, 365–370.
- Darryn E BRYANT and Barbara M MAENHAUT, *Defining sets of G-designs*, Australasian Journal of Combinatorics **17**, 257–266.
- C M Campbell, George HAVAS, S A Linton and E F Robertson, *Symmetric presentations and orthogonal groups*, The Atlas of Finite Groups Ten Years On., vol. 249, London Mathematical Society Lecture Notes Series, Cambridge University Press, pp. 1–10.
- R S COULTER, *Further evaluations of Weil sums*, Acta Arithmetica **86** (3), 217–226.
- R S COULTER, *Explicit evaluations of Weil sums*, Acta Arithmetica **83** (3), 241–251.
- Robert COULTER, George HAVAS and Marie HENDERSON, *Functional decomposition of a class of wild polynomials*, Journal of Combinatorial Mathematics and Combinatorial Computing **28**, 87–94.
- Diane DONOVAN, *Critical sets in families of Latin squares*, Utilitas Mathematica **53**, 3–16.
- Diane M DONOVAN and Adelle HOWSE, *Critical sets for Latin squares of order 7*, Journal of Combinatorial Mathematics and Combinatorial Computing **28**, 113–123.
- K E GATES, M GRIFFIN, G R Hanson and K Burrage, *Computer simulation of randomly oriented EPR spectra employing homotopy, magnetic resonance and related phenomena*, Proceedings of the Joint 29th AMPERE 13th ISMAR International Conference; Technische University Berlin, August 2–7, 1212–1213.
- K E GATES, M GRIFFIN, G R Hanson and K Burrage, *Computer simulation of magnetic resonance spectra employing homotopy*, Journal of Magnetic Resonance **135**, 104–112.
- Brenton D GRAY and Colin RAMSAY, *On the number of Pasch configurations in a Steiner triple system*, Bulletin of the Institute of Combinatorics and its Applications **24**, 105–112.
- Brenton D GRAY and Colin RAMSAY, *On a conjecture of Mahmoodian and Soltankhah regarding the existence of (v, k, t) trades*, Ars Combinatoria **48**, 191–194.
- Brenton D GRAY and Colin RAMSAY, *On the spectrum of $[v, k, t]$ trades*, Journal of Statistical Planning and Inference **69**, 1–19.
- Ken GRAY, *Perceptions of mathematical modelling in Australia: is it time to take gender off the agenda?*, Mathematical Modelling: Teaching and Assessment in a Technology-Rich World, (edited Peter Galbraith, Werner Blum, George Booker and Ian Huntley), Chapter 19, pp 177–186, Horwood Publishing, Chichester, UK.

- Nicholas HAMILTON, D Hazel, P Kearney and L Wildman, *A complete formal development using Cogito*, Proceedings of the 21st Australasian Computer Science Conference (ACSC'98) **20**, 319–330; Australian Computer Science Communications (February, 1997).
- Nicholas HAMILTON and Marialuisa J de Resmini, *Hyperovals and unitals in Figueroa planes*, European Journal of Combinatorics **19** (2), 215–220.
- George HAVAS, B S Majewski and K R MATTHEWS, *Extended gcd and Hermite normal form algorithms via lattice basis reduction*, Experimental Mathematics **7** (2), 125–136.
- George HAVAS and Clemens Wagner, *Matrix reduction algorithms for Euclidean rings*, Proceedings 1998 Asian Symposium on Computer Mathematics, Lanzhou University Press, Lanzhou, pp. 65–70.
- P HAWKES, *Differential weak key classes of IDEA*, Advances in Cryptology, Eurocrypt'98, Lecture Notes in Computer Science **1403**, 112–126; edited K Nyberg, Springer-Verlag.
- Marie HENDERSON, *Applications of linearised and sub-linearised polynomials to information security*, Information Security and Privacy, Lecture Notes in Computer Science (edited Ed Dawson, Colin Boyd), vol. 1438, Springer Verlag, pp. 227–237.
- Marie HENDERSON and Rex MATTHEWS, *Dickson polynomials of the second kind which are permutation polynomials over a finite field*, New Zealand Journal of Mathematics **27**, 227–244.
- Adelle HOWSE, *Families of critical sets for the dihedral group*, Utilitas Mathematica **54**, 175–191.
- Adelle HOWSE, *Minimal critical sets for some small Latin squares*, Australasian Journal of Combinatorics **17**, 275–288.
- A KHODKAR, *On smallest critical sets for the elementary abelian 2-group*, Utilitas Mathematica **54**, 45–50.
- A KHODKAR and D G Hoffman, *On the non-existence of Steiner $(v, k, 2)$ trades with certain volumes*, Australasian Journal of Combinatorics **18**, 303–311.
- Weifa LIANG and George HAVAS, *Finding the k most vital edges with respect to minimum spanning trees for $k = 2$ and 3*, Computing Theory '98 (Proceedings 4th Australasian Theory Symposium) (edited X Lin), Springer Verlag, pp. 37–50.
- Weifa LIANG, George HAVAS and Xiaojun Shen, *Improved lightpath (Wavelength) routing in large WDM networks*, Proceedings 18th International Conference on Distributed Computing Systems (edited M Papazoglou), IEEE Computer Society, pp. 516–523.
- Weifa LIANG and Hong Shen, *Multicasting and broadcasting in large WDM networks*, Proceedings First Merged International Parallel Processing Symposium and Symposium on Parallel and Distributed Processing, IEEE Computer Society, pp. 365–369.
- Weifa LIANG, George HAVAS and Anne Penfold STREET, *Parallel approximate edge coloring revisited*, Proceedings of PART'97, The Fourth Australasian Conference on Parallel and Real-Time Systems, (edited Nalin Sharda and Audrey Tan) Springer-Verlag Singapore, pp 95–103.
- Barbara M MAENHAUT, *The intersection problem for group divisible pentagon systems*, Bulletin of the Institute of Combinatorics and its Applications **24**, 73–78.
- C RAMSAY, I T Roberts and F Ruskey, *Completely separating systems of k -sets*, Discrete Mathematics **183**, 265–275.
- Deborah J Street and Anne Penfold STREET, *Partially balanced incomplete block designs and applications*, Wiley Encyclopaedia of Biosciences (edited Peter Armitage and Theodore Cotton), volume 4, pp 3268–3270, John Wiley and Sons, New York, London.
- Anne Penfold STREET and Deborah J Street, *Discrete approaches to mathematical modelling*, Mathematical Modelling: Teaching and Assessment in a Technology-Rich World, (edited Peter Galbraith, Werner Blum, George Booker and Ian Huntley), Chapter 22, pp 207–222, Horwood Publishing, Chichester, UK.
- Anne Penfold STREET and N H WILLIAMS, Australasian Journal of Combinatorics **17**, 320 pages.
- Anne Penfold STREET and N H WILLIAMS, Australasian Journal of Combinatorics **18**, 320 pages.
- D M Stump, W B Fraser and K E GATES, *The writhing of circular cross-section rods*, Proceedings of the Royal Society of London **454**, 2123–2156.
- Sarah ZAHRAI, *Engel quasigroups associated with cycle systems*, Australasian Journal of Combinatorics **17**, 175–183.
- Sarah ZAHRAI, *Minimal bases for the laws of certain cycle systems*, Australasian Journal of Combinatorics **18**, 105–110.
- 1999**
- Peter ADAMS, Darryn E BRYANT and Saad El-Zanati, *Packing and covering the complete graph with cubes*, Australasian Journal of Combinatorics **20**, 267–288.
- Peter ADAMS, Darryn E BRYANT and A KHODKAR, *On the number of repeated triples in balanced ternary designs with index 2*, Utilitas Mathematica **55**, 55–64.
- Elizabeth J BILLINGTON, *Decomposing complete tripartite graphs into cycles of length 3 and 4*, Discrete Mathematics **197/8**, 123–125.
- Elizabeth J BILLINGTON and Darryn E BRYANT, *The possible number of cycles in cycle systems*, Ars Combinatoria **52**, 65–70.
- Elizabeth J BILLINGTON, D G Hoffman and Barbara M MAENHAUT, *Group divisible pentagon systems*, Utilitas Mathematica **55**, 211–219.
- Darryn E BRYANT, A KHODKAR and Saad El-Zanati, *Small embeddings for partial G -designs when G is bipartite*, Bulletin of the Institute for Combinatorics and its Applications **26**, 86–89.
- Darryn E BRYANT and Sheila OATES-WILLIAMS, *Strongly 2-perfect trail systems and related quasigroups*, Australasian Journal of Combinatorics **20**, 101–110.
- Jin-Yi Cai, George HAVAS, Bernard Mans, Ajay Nerurkar, Jean-Pierre Seifert and Igor Shparlinski, *On routing in circulant graphs*, Computing and Combinatorics, Lecture Notes in Computer Science **1627**, 360–369.
- Gene Cooperman, Sandra Feisel, Joachim von zur Gathen and George HAVAS, *GCD of many integers*, Computing and Combinatorics, Lecture Notes in Computer Science **1627**, 310–317.
- Gene Cooperman and George HAVAS, *Elementary algebra revisited: randomized algorithms*, Randomization Methods in Algorithm Design, DIMACS Series in Discrete Mathematics and Theoretical Computer Science **43**, 37–44.
- Robert COULTER, *On the evaluation of a class of Weil sums in characteristic 2*, New Zealand Journal of Mathematics **28**, 171–184.
- Robert COULTER and Marie HENDERSON, *A class of functions and their application in constructing semi-biplanes and association schemes*, Discrete Mathematics **202**, 21–31.
- Diane DONOVAN, *Critical sets in Latin squares of order less than 11*, Journal of Combinatorial Mathematics and Combinatorial Computing **29**, 223–240.

- Xin Gui FANG, George HAVAS and Cheryl E Praeger, *On the automorphism groups of quasiprimitive almost simple graphs*, Journal of Algebra **222**, 271–282.
- Xin Gui FANG, George HAVAS and Jie Wang, *Automorphism groups of certain non-quasiprimitive almost simple graphs*, Groups St Andrews 1997 in Bath, I, London Mathematical Society Lecture Note Series **260**, 267–274; Cambridge University Press.
- Xin Gui FANG, George HAVAS and Jie Wang, *A family of non-quasiprimitive graphs admitting a quasiprimitive 2-arc transitive group action*, European Journal of Combinatorics **20**, 551–557.
- Holger W Gollan and George HAVAS, *On Sims' presentation for Lyons' simple group*, Proceedings Computational Methods for Representations of Groups and Algebras, Progress in Mathematics (Birkhaeuser) **173**, 235–240.
- Brenton D GRAY, *Defining sets of projective planes and biplanes and their residuals*, Journal of Combinatorial Mathematics and Combinatorial Computing **30**, 171–193.
- Brenton D GRAY and Colin RAMSAY, *On the spectrum of Steiner (v, k, t) trades II*, Graphs and Combinatorics **15**, 405–415.
- Brenton D GRAY and Colin RAMSAY, *Some results on defining sets of t -designs*, Bulletin of the Australian Mathematical Society **59**, 203–215.
- Nicholas HAMILTON and M J de Resmini, *Partitioning hyperovals in $PG(2, 64)$* , Bulletin of the Institute of Combinatorics and its Applications **27**, 89–94.
- N HAMILTON and A KHODKAR, *On the minimum possible volumes of strong Steiner trades*, Australasian Journal of Combinatorics **20**, 197–203.
- George HAVAS, Derek F Holt, P E Kenne and Sarah Rees, *Some challenging group presentations*, Journal of the Australian Mathematical Society (Series A) **67**, 206–213.
- George HAVAS, M F Newman, Alice C Niemeyer and Charles C Sims, *Groups with exponent six*, Communications in Algebra **27**, 3619–3638.
- George HAVAS and Jean-Pierre Seifert, *The complexity of the extended GCD problem*, Mathematical Foundations of Computer Science, Lecture Notes in Computer Science **1672**, 103–113.
- George HAVAS and Charles C Sims, *A presentation for the Lyons simple group*, Computational Methods for Representations of Groups and Algebras, Progress in Mathematics (Birkhaeuser) **173**, 241–249.
- George HAVAS and Clemens Wagner, *Some performance studies in exact linear algebra*, Distributed high performance computing and gigabit wide area networks, Lecture Notes in Control and Information Sciences **249**, 161–170.
- P HAWKES and L O'Connor, *XOR and non-XOR differential probabilities*, Advances in Cryptology, Eurocrypt'99 (Prague), Lecture Notes in Computer Science, Springer Verlag, Berlin **1592**, 272–285.
- Marie HENDERSON and R Matthews, *Composition behaviour of sub-linearised polynomials over a finite field*, Finite fields: theory, applications and algorithms, Contemporary Mathematics **225**, 67–75.
- Weifa Liang, George HAVAS and Anne Penfold STREET, *Finding a low-diameter and low-weight k -connected subgraph*, Congressus Numerantium **136**, 161–175.
- Ebadollah S Mahmoodian, Nasrin Soltankhah and Anne Penfold STREET, *Defining sets of directed designs*, Australasian Journal of Combinatorics **19**, 179–190.
- R Mathon and N HAMILTON, *Baer partitions of small order projective planes*, Journal of Combinatorial Mathematics and Combinatorial Computing **29**, 87–94.
- Tony MORAN, *Defining sets for $2-(19, 9, 4)$ designs and a class of Hadamard matrices*, Utilitas Mathematica **55**, 161–187.
- Colin RAMSAY, *On the index of simple trades*, Australasian Journal of Combinatorics **20**, 207–221.
- A J RASMUSSEN, K E GATES and S C Smith, *A pseudo-spectral algorithm for the computation of transitional-mode eigenfunctions in loose transition states II: Optimized primary and grid representations*, Journal of Chemical Physics **110** (3), 1354–1364.
- Anne Penfold STREET and N H WILLIAMS, Australasian Journal of Combinatorics **19**, 312 pages.
- Anne Penfold STREET and N H WILLIAMS, Australasian Journal of Combinatorics **20**, 307 pages.
- Deborah J Street and Anne Penfold STREET, *But where are designs used?*, Ars Combinatoria **53**, 3–26.

2000

- Darryn E BRYANT, S El-Zanati and C A Rodger, *Maximal sets of Hamilton cycles in $K_{n,n}$* , Journal of Graph Theory **33**, 25–31.
- Diane DONOVAN and Adelle HOWSE, *Towards the spectrum of critical sets*, Australasian Journal of Combinatorics **21**, 107–130.
- Nicholas HAMILTON, S Stoichev and V D Tonchev, *Maximal arcs and disjoint maximal arcs in projective planes of order 16*, Journal of Geometry, Proceedings of the Second Pythagorean Conference **67**, 117–126.
- C C Lindner and Anne Penfold STREET, *The metamorphosis of λ -fold block designs with block size four into λ -fold 4-cycle systems*, Bulletin of the Institute of Combinatorics and its Applications **28**, 7–18.
- Anne Penfold STREET and N H WILLIAMS, Australasian Journal of Combinatorics **21**, 316 pages.

Refereed, to appear

- Peter ADAMS, *Decomposing a complete graph into a golf schedule*, Bulletin of the Institute of Combinatorics and its Applications.
- Peter ADAMS, Elizabeth J BILLINGTON, I J Dejter and C C Lindner, *The number of 4-cycles in 2-factorizations of K_{2n} minus a 1-factor*, Discrete Mathematics.
- Peter ADAMS, Elizabeth J BILLINGTON, Darryn E BRYANT and A KHODKAR, *The μ -way intersection problem for m -cycle systems*, Discrete Mathematics.
- Peter Adams, Darryn E BRYANT and Sean BYRNES, *Applications of graph theory in DNA sequencing by hybridization*, Bulletin of the Institute of Combinatorics and its Applications.
- Peter ADAMS, Darryn E BRYANT and A KHODKAR, *The fine structure of $(v, 3)$ directed triple systems: $v \equiv 2 \pmod{3}$* , Ars Combinatoria.
- Peter ADAMS, Darryn E BRYANT and A KHODKAR, *The spectrum problem for λ -fold Petersen graph designs*, Journal of Combinatorial Mathematics and Combinatorial Computing.
- Peter ADAMS, Darryn E BRYANT and A KHODKAR, *On Alspach's conjecture with two even cycle lengths*, Discrete Mathematics.
- Peter ADAMS, Darryn E BRYANT and A KHODKAR, *The spectrum problem for closed m -trails, $m \leq 10$* , Journal of Combinatorial Mathematics and Combinatorial Computing.
- Peter ADAMS, Darryn E BRYANT and A KHODKAR, *The fine structure of balanced ternary designs with block size three, index three and $p_2 = 1, 2$* , Ars Combinatoria.

- Peter ADAMS and A KHODKAR, *Smallest critical sets for the groups of size eight*, Journal of Combinatorial Mathematics and Combinatorial Computing.
- Peter ADAMS, A KHODKAR and Colin RAMSAY, *Smallest defining sets of some STS(19)*, Journal of Combinatorial Mathematics and Combinatorial Computing.
- Bronwyn J Battersby, Darryn E BRYANT, Wim Meutermaans, Daniel Matthews, Mark L Smythe and Matt Trau, *Towards larger chemical libraries: encoding with fluorescent colloids in combinatorial chemistry* Journal of the American Chemical Society.
- Richard BEAN and Diane Donovan, *Closing a gap in the spectrum of critical sets*, Australasian Journal of Combinatorics.
- Elizabeth J BILLINGTON and D G Hoffman, *Trades and graphs*, Graphs and Combinatorics.
- Elizabeth J BILLINGTON and C C Lindner, *The metamorphosis of λ -fold 4-wheel systems into λ -fold 4-cycle systems*, Utilitas Mathematica.
- Darryn E BRYANT, *On the Oberwolfach problem with two similar length cycles*, Graphs and Combinatorics.
- Darryn E BRYANT, *5-cycle systems of $\lambda(K_v \setminus K_u)$* , Journal of Combinatorial Mathematics and Combinatorial Computing.
- Darryn E BRYANT and A KHODKAR, *Maximum packings of $K_v \setminus K_u$ with triples*, Ars Combinatoria.
- Darryn E BRYANT and A KHODKAR, *On the intersection problem for 1-factorizations and near 1-factorizations of K_v* , Utilitas Mathematica.
- Michael Bulmer, Diane DONOVAN, Catherine Holmes and Bevan Thompson, *Calculus Connection, A multimedia adventure*, Proceedings of EMAC.
- Nicholas J CAVENAGH and Elizabeth J BILLINGTON, *Decompositions of complete multipartite graphs into cycles of even length*, Graphs and Combinatorics.
- Angelina CHIN, *Some rings of invariants at the prime two*, International Journal of Algebra and Computation.
- F de Clerck, N HAMILTON, C M O'Keefe and T Penttila, *Quadratic sets and related structures*, Australasian Journal of Combinatorics.
- Diane DONOVAN, *The completion of partial Latin squares*, Australasian Journal of Combinatorics.
- Greg GAMBLE and Cheryl E Praeger, *Vertex-primitive groups and graphs of order twice the product of two distinct odd primes*, Journal of Group Theory.
- Brenton D GRAY and Colin RAMSAY, *On the spectrum of Steiner (v, k, t) trades I*, Journal of Combinatorial Mathematics and Combinatorial Computing.
- M GRIFFIN, A Muys, C Nobel, C Eldershaw, K E GATES, K Burrage and G R Hanson, *XSope, a computer simulation software suite for the analysis of electron paramagnetic resonance spectra*, Molecular Physics; Invited article for a special issue.
- Nicholas HAMILTON and C Quinn, *m -systems of polar spaces and maximal arcs in projective planes*, Bulletin of the Belgian Mathematical Society Simon Stevin.
- N HAMILTON and T Penttila, *Sets of type (a, b) from subgroups of $\Gamma L(1, p^r)$* , Journal of Algebraic Combinatorics.
- George HAVAS, M F Newman, Alice C Niemeyer and Charles C Sims, *Computing in groups with exponent six*, Computational and Geometric Aspects of Modern Algebra, London Mathematical Society Lecture Note Series **275**, Cambridge University Press, 87–100.
- George HAVAS and Colin RAMSAY, *Proving a group trivial made easy: a case study in coset enumeration*, Bulletin of the Australian Mathematical Society **62**, 105–118.
- George HAVAS, Leonard H Soicher and Robert A Wilson, *A presentation for the Thompson sporadic simple group*, Proceedings Groups and Computation, de Gruyter.
- M HENDERSON and R MATTHEWS, *Composition behaviour of linearised and sub-linearised polynomials over a finite field*, Proceedings of the Fourth International Conference on Finite Fields and their Applications, American Mathematical Society.
- A KHODKAR, *Number of common triples in simple balanced ternary designs*, Ars Combinatoria.
- W LIANG and X Shen, *Finding the k most vital edges in the minimum spanning tree problem*, Parallel Computing.
- G J McLachlan, S K Ng, Peter ADAMS, D C McGiffin and A J Galbraith, *An algorithm for fitting mixtures of Gompertz distributions to censored survival data*, Journal of Statistical Software **2** (7).
- Barbara M MAENHAUT, *On the volume of 5-cycle trades*, Graphs and Combinatorics.
- Jennifer Seberry and Anne Penfold STREET, *Strongbox secured secret sharing schemes*, Utilitas Mathematica **57**.

Research reports and papers submitted for publication

- Peter ADAMS, Elizabeth J BILLINGTON, Darryn E BRYANT and E S Mahmoodian, *The three-way intersection problem for latin squares*.
- Peter ADAMS, Darryn E BRYANT and A KHODKAR, *On Alspach's conjecture with two even cycle lengths*.
- Peter ADAMS and A KHODKAR, *Smallest weak and smallest totally weak critical sets for the latin squares of order at most seven*.
- Lynn Margaret Batten, *A private key cryptosystem with signature capability based on blocking sets in $PG(2, q)$* .
- Elizabeth J BILLINGTON, *The metamorphosis of λ -fold 4-wheel systems into λ -fold bowtie systems*.
- Elizabeth J BILLINGTON, Hung-Lin Fu and C A Rodger, *Packing complete multipartite graphs with 4-cycles*.
- Elizabeth J BILLINGTON and D G Hoffman, *Trade spectra of complete partite graphs*.
- Darryn E BRYANT and A KHODKAR, *On the intersection problem for 1-factorizations and near 1-factorizations of K_v* .
- Nicholas J CAVENAGH and Elizabeth J BILLINGTON, *On decomposing complete tripartite graphs into 5-cycles*.
- Angelina CHIN, *The integral cohomology of some p -groups*.
- Diane M DONOVAN, Rebecca A H Gower and A KHODKAR, *Latin interchanges and direct products*.
- Chin-Mei Fu, Hung-Lin Fu and Anne Penfold STREET, *Two-colorable $\{C_4, C_k\}$ -designs*.
- N HAMILTON and R Mathon, *Existence and non-existence of m -systems of polar spaces*.
- N HAMILTON and T Penttila, *Groups of maximal arcs*.
- George HAVAS and Colin RAMSAY, *Experiments in coset enumeration*, Proceedings Groups and Computation, de Gruyter.
- A KHODKAR, *The fine structure of $(v, 3)$ directed triple systems: $v \in \{4, 6, 7, 9, 10, 12, 13\}$* .
- A KHODKAR and Sarah ZAHRAI, *A single law for the variety of strongly 2-perfect m -cycle systems*.
- A KHODKAR and Sarah ZAHRAI, *On single laws for the varieties of 2-perfect extended m -cycle systems*.

Weifa LIANG, George HAVAS and X Shen, *Permutation routings in all-optical networks*, Technical Report 436 (1998), The University of Queensland.

W LIANG and B McKay, *An NC approximation algorithm for the optimal k -edge connectivity augmentation problem*.

K R MATTHEWS, *Short solutions of $AX = B$ using a LLL-based Hermite normal form algorithm*.

R A Mathon and Nicholas HAMILTON, *Baer partitions of small order projective planes*.

Rudolf A Mathon and Anne Penfold STREET, *Designs arising from further partitions of sets of blocks*.

Jennifer Seberry and Anne Penfold STREET, *A secret sharing scheme based on computational infeasibility*.

Web site

K R MATTHEWS, *The Number Theory Web*, <http://www.maths.uq.edu.au/~krm/>.